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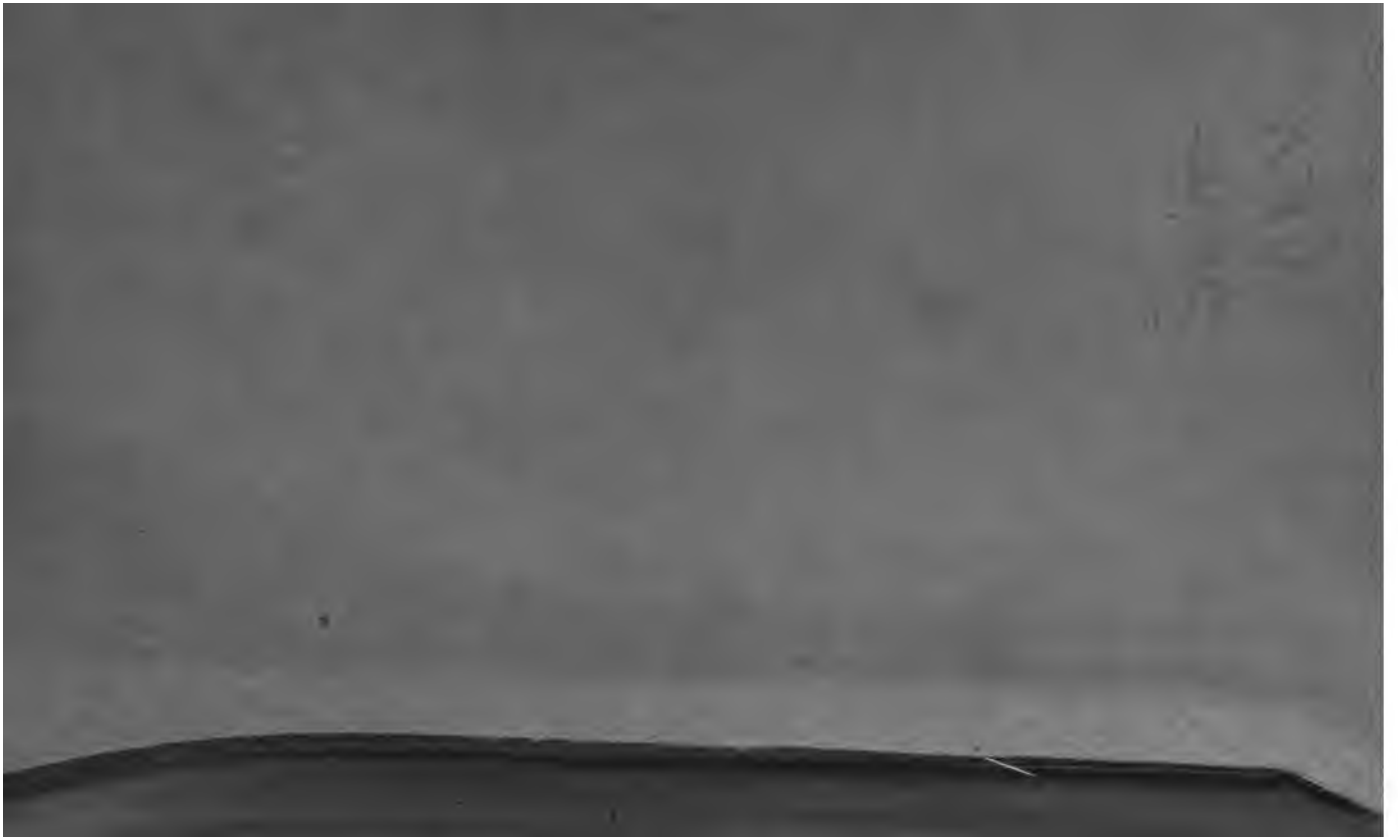

MIND IN THE MAKING

A STUDY IN MENTAL DEVELOPMENT

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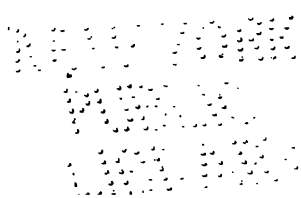

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TO THE MEMORY OF MY FATHER

CHARLES E. SWIFT

PREFACE

THE most significant tendency in educational literature to-day is the substitution of the individual for the course of study as the basis of constructive pedagogy. The rapid growth of American cities has centred attention upon the machinery of school systems, while the great increase in college attendance and the influence of the methods of German universities have too completely submerged the individual. Educators have lately been taking an inventory and have discovered racial and individual assets which had to a great extent been overlooked. Some of these formative influences are positive forces which should be directed into lines advantageous to the individual and to society; others, which are negative and tend to mental arrest, should, so far as possible, be curbed and repressed. An environment which is good in one instance may be inert in another. To foster growth it must meet individual needs, and these can be learned only by studying the native tendencies and peculiar dispositions of pupil and student. This book is a plea for the personal element in education, and for the extension of the experimental method.

Some of the chapters have appeared in whole or in

MIND IN THE MAKING: A STUDY IN MENTAL DEVELOPMENT

CHAPTER I

STANDARDS OF HUMAN POWER

Our New England forefathers seem to have been lavishly supplied with intuitions concerning the signs of the various virtues and to have delighted in exhibiting specimens before the young, both as objects of emulation and solemn examples. But it is impossible to help being amused by their naïve exposure of the stage machinery, and one cannot but wonder whether the school-boys themselves did not smile, since even Puritan boys may have had a tinge of frivolity, when they read in picturesque verse the maxims designed to kindle their zeal for learning.[1] We do not know how effective these amiable lures to perfection were, but probably the boy who is at chronic war with his book was quite as much of a problem then as now. Nothing to-day causes more or worse worries. Parents pine over his future, and teachers fall into despair in their perplexity about what to do with him.

[1] "The boy that is good
Does mind his book well;
And if he can't read
Will strive for to spell.

"His school he does love;
And when he is there
For play and for toys
No time can he spare."

From the *Youth's Instructor in the English Tongue, or the Art of Spelling Improved*, quoted by Clifton Johnson in his *Old-time Schools and School-Books*, p. 61.

It would seem as though, under the stress of this parental misery and pedagogic flurry, the "dull" boy would have been a subject studied to exhaustion; yet, quite inconsistently, while conceding failure to get results, he it is about whom teachers speak with indisputable assurance. The solution of the dullard favorably received by educators is his segregation from his seemingly more intelligent classmates, and this is the sum of wisdom in his behalf. The remedy is a lame one, since the standards for the classification of dull boys are, at present, so indefinite.

Recent medical science has shown that dulness may be caused by a variety of pathological conditions far removed in their location from the immediate centre of intelligence, and it is the imperative duty of educators to locate these causes and, when possible, to remove them, instead of shirking the responsibility by grouping all backward children together. The source of some of the reflex irritations that derange cerebral processes and blunt mental acuity will be discussed later. There is, however, another class of "backwards" so clearly defined in the biographies of those whose subsequent careers revealed distinguishing ability that it is permissible to ask why educational procedure has been so little influenced by knowledge of the seeming stupidity in school-days of these eminent men and women. The subject is certainly worth investigating, and it was in the hope of getting some new points of view that the childhood days of the men and women referred to in this chapter were studied.

Linnæus's gymnasium director would have made a cobbler of him, telling[1] his father that he was unfit for a

[1] *Famous Men of Science*, by Sarah K. Bolton.

learned profession. Yet all this time the boy was lost in the undergrowth of thoughts which in their maturity were to revolutionize the science of botany. When he went up to the university, the director gave him this certificate: "Youth at school may be compared to shrubs in a garden, which will sometimes, though rarely, elude all the care of the gardener, but if transplanted into a different soil may become fruitful trees. With this view, therefore, and no other, the bearer is sent to the university, where it is possible that he may meet with a climate propitious to his progress." And the director's only claim to fame is that he wrote this note.

"During my whole life," says Charles Darwin in his autobiography, "I have been singularly incapable of mastering any language. . . . When I left the school I was for my age neither high nor low, and I believe that I was considered by all my masters and by my father as a very ordinary boy, rather below the common standard in intellect. To my deep mortification my father once said to me, 'You care for nothing but shooting, dogs, and rat-catching, and you will be a disgrace to yourself and all your family.'"[1] Dr. Butler, the head master, once rebuked him for wasting his time on such subjects as chemistry, but no one would have heard of the Doctor had not Darwin rescued him from the dark waters of oblivion by pulling him into his autobiography.

Harriet Martineau's parents considered her mind dull and unobservant and unwieldy.[2] Though a born musician, "never known to sing out of tune," she could do nothing in the presence of her irritable master, Mr.

[1] *Life and Letters*, pp. 29–30.
[2] *Autobiography*, edited by Maria Weston Chapman, 1877, Vol. I, p. 27.

Beckwith. "Now and then he complimented my ear," she tells us, "but he oftener told me that I had no more mind than the music-book, . . . and that it was no manner of use trying to teach me anything. All this time, if the room door happened to be open without my observing it when I was singing Handel by myself, my mother would be found dropping tears over her work, and I used myself, as I may now own, to feel fairly transported." [1]

"I was the first of my family," she continues, "who failed in the matter of hand-writing; and why I did remains unexplained. I am sure I tried hard; but I wrote a vulgar, cramped, untidy scrawl till I was past twenty;—till authorship made me forget manner in matter and gave freedom to my hand. . . . It was a terrible penance to me to write letters home from Bristol, and the day of the week when it was to be done was very like the Beckwith music-lesson days. If anyone had told me then how many reams of paper I should cover in the course of my life, life would have seemed a sort of purgatory to me." [2]

Miss Martineau speaks interestingly of a visit to some cousins when she was about sixteen years old. "I still think," she says, "that I never met with a family to compare with theirs for power of acquisition, or effective use of knowledge. They would learn a new language at odd minutes; get through a tough philosophical book by taking turns in the court for air; write down an entire lecture or sermon, without missing a sentence; get round the piano after a concert, and play and sing every new piece that had been performed. Ability like this

[1] *Loc. cit.*, Vol. I, p. 42.
[2] *Loc. cit.*, Vol. I, p. 69.

was a novel spectacle to me; and it gave me the pure pleasure of unmixed admiration; for I was certainly not conscious of any ability whatever at that time." [1] Yet these cousins are known to-day only from a page in the autobiography of the timid, backward girl, who sat unnoticed in the drawing-room shadows made gloomier by contrast with the brilliancy of their precocious minds.

Napoleon Bonaparte does not seem to have distinguished himself in any of his studies at the military school in Paris, unless, perhaps, in mathematics. In the final examination for graduation he stood forty-second in his class.[2] Who were the forty-one above him? "Neither he nor his sister Eliza, the two strong natures of the family, could ever spell any language with accuracy and ease, or speak and write with rhetorical elegance." [3] Napoleon's laxity in matters of military discipline after he joined the artillery is astonishing in view of his later success, and in 1789 he fully decided to withdraw from the service.[4]

William H. Seward's teacher once reported to his father that he was too stupid to learn.[5] Like his classmates, Seward used to while away the tedium of Dr. Wayland's Homer recitations by reading novels.

Patrick Henry "was too idle to gain any solid advantage from the opportunities which were thrown in his way. He was passionately addicted to the sports of the field, and could not support the confinement and toil which education required. Hence, instead of system or any semblance of regularity in his studies, his

[1] *Loc. cit.*, Vol. I, p. 71.
[2] *Life of Napoleon Bonaparte*, by William M. Sloane, 1896, Vol. I, p. 33.
[3] *Loc. cit.*, Vol. I, p. 36.
[4] *Loc. cit.*, Vol. I, p. 48.
[5] *Autobiography*, 1877, p. 22.

efforts were always desultory, and became more and more rare until at length, when the hour of his school exercises arrived, Patrick was scarcely ever to be found." [1] Instead, he went fishing and hunting for days and weeks at a time. His biographer, Wirt, could not learn "that he gave in his youth any evidence of that precocity which sometimes distinguishes uncommon genius. His companions recollect no instance of premature wit, no striking sentiment, no flash of fancy, no remarkable beauty or strength of expression; and no indication, however slight, either of that impassioned love of liberty, or of that adventurous daring and intrepidity, which marked so strongly his future character. So far was he, indeed, from exhibiting any one prognostic of this greatness, that every omen foretold a life, at best of mediocrity, if not of insignificance. His person is represented as having been coarse, his manners uncommonly awkward, his dress slovenly, his conversation very plain, his aversion to study invincible, and his faculties almost entirely benumbed by indolence. No persuasion could bring him either to read or to work. On the contrary, he ran wild in the forest, like one of the aborigines of the country, and divided his life between the dissipation and uproar of the chase and the languor of inaction." [2]

Started in business as a merchant by his father, his indolence brought speedy failure. Married at eighteen without any means of support, his father and father-in-law came to his aid with a little farm, the work of which he so hated that relief soon came in failure. Another attempt at business, followed by bankruptcy, and he de-

[1] *Sketches of the Life and Character of Patrick Henry*, by William Wirt, 1852.

[2] *Ibid.*, Vol. I, p. 24.

termined, *as a last hope*, to try law. Yet neither he nor his friends seem to have had any confidence in his success. But the rest of his life is the country's history.

Sir Isaac Newton has said of himself that at twelve he "was extremely inattentive to his studies and stood very low in the school." [1] At that time his position was last in the next to the lowest form. So little ability did he show that at fifteen he was taken out of school and set at work upon the farm. Later, in one of his university examinations in Euclid, he made so poor a showing as to be reproved by the examiner.[2] In this instance, however, his failure seems to have been due to his unwillingness to be restricted by "approved" methods of demonstration.

John Dalton was not quick, intellectually.[3] Indeed, there was nothing in his work to indicate any unusual ability.

Samuel Johnson was indolent. "My master," he once said,[4] "whipt me very hard. Without that, sir, I should have done nothing."

"Swift's college course was entirely without brilliancy or promise; in his last term examination he failed in two out of the three subjects," [5] and he was refused his degree because of "dulness and insufficiency." He was finally allowed to take it only by "special favor." [6]

When a boy in school, Wordsworth [7] made but little

[1] David Brewster's *Memoirs of the Life, Writings and Discoveries of Isaac Newton*, Vol. I, pp. 7 and 14.
[2] King's *Biographical Sketch of Sir Isaac Newton*, p. 21.
[3] *John Dalton*, by Sir Henry E. Roscoe, p. 17.
[4] Boswell's *Life of Johnson*, Vol. I, p. 53.
[5] *The Prose Works of Jonathan Swift, with a Biographical Introduction* by W. E. H. Lecky, 1897, Vol. I, p. xiv.
[6] Leslie Stephen's *Jonathan Swift* (*English Men of Letters*), p. 7.
[7] *William Wordsworth, the Story of his Life*, by James Middleland, London, 1887.

progress, spending his time chiefly in reading *Gulliver's Travels, Don Quixote, The Tale of a Tub, Fielding's Works, Gil Blas* and other similar books. As late as seventeen years of age he was wholly incapable of continued application to prescribed work.[1] His university career grievously disappointed his friends, and up to about twenty-five years of age he shifted aimlessly from one thing to another, causing his friends endless anxiety because of his seeming inability to settle down to any regular work. "In truth he was a strange and wayward wight." [2]

Wordsworth himself has left on record how little pleasure he found in the lecturer's room

> All studded round, as thick as chairs could stand,
> With loyal students faithful to their books,
> Half-and-half idlers, hardy recusants,
> And honest dunces.[3]

Called upon to choose his companions from among the indolent or industrious, he chose the former, and together they talked

> Unprofitable talk at morning hours;
> Drifted about along the streets and walks,
> Read lazily in trivial books, went forth
> To gallop through the country in blind zeal
> Of senseless horsemanship, or on the breast
> Of Cam sailed boisterously, and let the stars
> Come forth, perhaps without one quiet thought.

It is decidedly significant, in view of Wordsworth's attitude toward his studies, that from the beginning to the end of his school career not one of his teachers made the slightest impression upon him. Whether this was altogether his fault is a very pertinent question.

[1] Émile Legouis's *The Early Life of William Wordsworth*, p. 71.
[2] From Dorothy Wordsworth's Letter, quoted in *Knight's Life of Wordsworth*, Vol. I, p. 83.
[3] Prelude, *Complete Poetical Works*.

Richard Brinsley Sheridan was indolent in school and ranked correspondingly low. Dr. Parr, his language teacher at Harrow, says that there was little in his boyhood worth communicating; "he was inferior to many of his school fellows in the ordinary business of a school, and I do not remember any one instance in which he distinguished himself in Latin or Greek composition, either in prose or verse." . . . He was "not only slovenly in construing, but unusually defective in his Greek grammar." [1] Dr. Parr's Greek and Latin prose was doubtless admirable, but he is known only as the teacher under whom Sheridan could not succeed. To his teachers at Harrow he was remarkable in nothing but his idleness and winning manners.

Robert Fulton [2] was a dullard because his mind was filled with thoughts about other things than his studies; but his teachers could not understand this, and so the birch rod became a frequent persuader.

Alexander von Humboldt said of himself "that in the first years of his childhood his tutors were doubtful whether even ordinary powers of intelligence would ever be developed in him, and that it was only in later boyhood that he began to show any evidence of mental vigor." [3] "Until I reached the age of sixteen," he says,[4] "I showed little inclination for scientific pursuits. I was of a restless disposition, and wished to be a soldier. This choice was displeasing to my family, who were desirous that I should devote myself to the study of finance, so that I had no opportunity of attending a course of botany or chemistry; I am self-taught in almost all

[1] *Memoirs*, by Thomas Moore, Vol. I, p. 12.
[2] *The Life of Robert Fulton*, by Thomas W. Knox, 1886.
[3] Karl Bruhns's *Life of Alexander von Humboldt*, Vol. I, p. 31.
[4] *Ibid.*, p. 26.

the sciences with which I am now so occupied, and I acquired them comparatively late in life." At nineteen years of age he had never heard of botany. It was at this time that he made the acquaintance of a youth of his own age who had just published a Flora of Berlin. "His gentle and amiable character stimulated the interest I felt in his pursuits. . . . I became passionately devoted to botany and took special interest in the study of cryptogamia." Meanwhile he seems not to have made much progress in Greek, since at this same age, nineteen, he wrote to his friend Wegener that he "was still struggling with prophets and otters in the first declension." The preface to a letter in Greek to his friend, written shortly after, runs, "I must freely confess that I fear you will not understand a syllable of all that I have written, and then I shall have to say with Sancho Panza: 'Your worship does not understand me? No matter. God, who knows all things, understands me.'"[1]

Heine made a poor showing at school. His mind was too keen and alert for him to excel in the imitative class work. The dates in Roman history were an unceasing annoyance, though, as he tells us, he afterward came to appreciate their value because he has since known people with "nothing in their heads but a date or two, by the help of which they have found the right houses in Berlin and become full professors;"[2] but "reckoning was worse yet," while as to Greek, "the monks of the Middle Ages were not so far wrong when they declared that it was an invention of the devil. God knows what misery I suffered with it." He hated French metres and could not write their verses, so his teacher vowed he had

[1] *Ibid.*, p. 54.
[2] *Heine's Life, Told in His Own Words*, New York, 1893, p. 11.

no soul for poetry and called him a barbarian from the German woods. He idled away his time at Bonn and was "horribly bored" by the "odious, stiff, cut-and-dried tone" of Göttingen University. Nothing pleased him. The professors were more leathery than at Bonn, so he busied himself a good deal with students' duels. "It amuses me," he says, "for want of something better; and it is at least better than the wet rags of teachers, young and old, of our Georgia Augusta."

The hatred of Joseph Banks, the English naturalist, for the monotony of school routine was so marked as to bring complaint from his teachers. Yet it was not dislike for work; he simply could not travel the road by which alone the educational doctors would permit him to reach the golden gate. One day when he came out of the water in which he had been bathing, he found his companions gone and, after dressing, he walked slowly home along a meadow-path fringed on either side with fragrant flowers. Life had never shown such charms, and he exclaimed, "How beautiful! Would it not be far more reasonable to make me learn the nature of these plants than the Greek and Latin I am confined to?"[1]

In her early days George Eliot was not precocious. It was with some difficulty that she learned to read, though her brother Isaac, with pardonable pride, thought that this was because she enjoyed playing so much more than studying.[2] "Hers was a large, slow-growing nature," said her husband, "and I think it is, at any rate, certain that there was nothing of the infant phenomenon about her."

[1] *The Works of Henry Lord Brougham and Vaux*, Vol. I, p. 337.
[2] *George Eliot's Life as related in her Letters and Journals*, edited by J. W. Cross, Vol. I. p. 11.

Sir Walter Scott[1] never took very kindly to the school pabulum but, instead, read great quantities of poetry and fiction. "Though often negligent of my own task," he says, "I was always ready to assist my friends; and hence I had a little party of staunch partisans and adherents, stout of hand and heart, though somewhat dull of head—the very tools for raising a hero to eminence."[2] In reading of Scott's boyhood one is continually impressed by the evidence that he was always brilliant in his own way but mediocre when tested by school criteria.

John Hunter, the celebrated anatomist and surgeon, is reported by one writer to have been unable to read or write at seventeen years of age, so great was his hatred for school; but he enjoyed keenly all out of door sports. He was called indolent and he himself tells why. "When I was a boy I wanted to know about the clouds and the grasses, and why the leaves changed color in the autumn; I watched the ants, bees, birds, tadpoles and caddis worms; I pestered people with questions about what nobody knew or cared anything."[3] In his unappreciated condition of learned ignorance he just missed becoming a cabinet-maker through the fortunate failure in business of his brother-in-law, in whose carpenter shop he was working.

Charles Lyell states[4] that, when a boy, he had an excessive aversion to work unless forced to it.

A book, with colored plates, by Gesner, the Swiss naturalist, seems to have been the touchstone which united in Cuvier the disconnected powers of which he himself

[1] *Sir Walter Scott, the Story of his Life*, by R. Shelton Mackenzie.
[2] Autobiography in J. G. Lockhart's *Life of Sir Walter Scott*, p. 26.
[3] *Two Great Scotsmen, the Brothers William and John Hunter*, by George R. Mather, Glasgow, 1893, p. 120.
[4] *Life, Letters and Journals of Sir Charles Lyell*, edited by his sister-in-law, Mrs. Lyell, London, 1881.

was, at best, but dimly conscious, and made them active. The works of Buffon did the rest.[1]

Hegel[2] never distinguished himself in the lower schools, and on leaving the university of Tübingen his certificate stated that he was of middling industry and knowledge, but especially deficient in philosophy.

Dr. Cardew, in whose school Sir Humphrey Davy was placed at fourteen years of age, says[3] that he did not at that time observe any extraordinary ability in young Davy nor any special talent for those scientific pursuits in which he afterward became so eminent.[4] He kept the good Mr. Tonkin in constant terror by explosions in the attic where he was playing with chemicals. "This boy Humphrey is incorrigible," cried the old gentleman one day; "was there ever so idle a dog?"[5] At the grammar school he "had the reputation of being an idle boy, with a gift for making verses, but with no aptitude for studies of a graver sort."[6] Indeed, at no time during his boyhood does he seem to have given any indication of superior talent or unusual quickness.[7]

At the Aberdeen Grammar School, Byron reached the head of his class, "for it was the custom there to invert the proper order of the classes at the beginning of the lesson, so that the most ignorant were for the moment placed first; and more than once the master said,[8] bantering him, 'Now, George, man, let me see how soon you'll be at the foot.'" At Trinity College, Cambridge,

[1] *Memoirs of Cuvier*, by Mrs. R. Lee, New York.
[2] *William Wallace*, in *Encyclopædia Britannica*.
[3] *Memoirs of the Life of Sir Humphrey Davy*, by his Brother, John Davy, London, 1836, Vol. I, p. 20.
[4] *Humphrey Davy*, by T. E. Thorpe, p. 12.
[5] *Kings of the Rod, Rifle and Gun*, by Thormanby, 1901, Vol. I, p. 300.
[6] *Loc. cit.*, p. 299.
[7] *The Works of Henry Lord Brougham and Vaux*, 1873, Vol. I, p. 108.
[8] *The Life of Lord Byron*, by Roden Noel, London, 1890, p. 33.

"he was never anything but a poor scholar, bestowing little care on the studies of the place."[1]

It is interesting to learn that so clever a writer as Huxley "detested the trouble of writing, and would take no pains with it"[2] till long past twenty years of age. "My regular school training," he testifies, "was of the briefest; perhaps fortunately, for though my way of life has made me acquainted with all sorts and conditions of men, from the highest to the lowest, I deliberately affirm that the society I fell into at school was the worst I have ever known. We boys were average lads, with much the same inherent capacity for good and evil as any others; but the people who were set over us cared about as much for our intellectual and moral welfare as if they were baby farmers."[3]

In the Military Academy of Duke Karl Eugene, Schiller, then a lad of sixteen, did not show any proficiency in philosophy, rhetoric, or law. Greek seems to have been the only study in which he excelled. In one of his school reports we find that "Schiller has abundance of good-will, and shows great desire to learn; his negligence and lack of alertness, however, call for repeated reproof. He is sensible of his faults, and strives to correct them."[4] Being behind in the studies in which he was registered, Schiller decided, shortly after this, to change his course and take up medicine. When the time for graduation came, his thesis on *The Influence of the Body upon the Mind* was not satisfactory and he was not allowed to graduate that year.

[1] *Loc. cit.*, p. 54.
[2] *Life and Letters*, Vol. I, p. 22.
[3] *Loc. cit.*, p. 5.
[4] *The Life of Schiller*, by Heinrich Duntzer, translated by Percy E. Pinkerton, London, 1883, pp. 41, 42, 45.

James Russell Lowell was reprimanded, at first privately and then publicly, in his sophomore year, "for general negligence in themes, forensics and recitations."[1] His relatives grieved at his "indolence," and on the 25th day of June, 1838, the college faculty voted that he be suspended "on account of continued neglect of his college duties." During this period of rustication he was required to review Locke's *Essay on the Human Understanding* and study Mackintosh's *Review of Ethical Philosophy* with a tutor, reciting twice a day.[2]

Oliver Goldsmith's teacher, in his early childhood, thought him one of the dullest boys that she had ever tried to teach. She said that he was "impenetrably stupid"; she was afraid that nothing could be done with him.[3] Later in his school course he made no unusual progress and was considered careless and indolent. His indolence and dislike for his university tutor, who called him ignorant and stupid before his classmates, combined to make him hate mathematics, science and philosophy. "A lad," he says, "whose passions are not strong enough in youth to mislead him from that path of science which his tutors, and not his inclinations, have chalked out, by four or five years' perseverance will probably obtain every advantage and honor his college can bestow. I would compare the man whose youth has been thus passed in the tranquillity of dispassionate prudence, to liquors that never ferment, and, consequently, continue always muddy."[4]

His family felt keenly his failure to take a prominent

[1] *James Russell Lowell*, a Biography, by Horace Elisha Scudder, 1901, Vol. I, p. 30.
[2] *Loc. cit.*, Vol. I, p. 47.
[3] Irving's *Life of Goldsmith*, p. 19.
[4] *Ibid.*, p. 32.

place in the university. "The first opportunity my father had of finding his expectations disappointed," he writes, "was in the very middling figure I made at the university: he had flattered himself that he should soon see me rising into the foremost rank in literary reputation, but was mortified to find me utterly unnoticed and unknown. His disappointment might have been partly ascribed to his having overrated my talents and partly to my dislike of mathematical reasoning, at a time when my imagination and memory, yet unsatisfied, were more eager after new objects, than desirous of reasoning upon those I knew. This, however, did not please my tutors, who observed, indeed, that I was a little dull, but at the same time allowed that I seemed to be very good natured, and had no harm in me."[1]

Priestley's "whole education was exceedingly imperfect, and excepting in Hebrew and in Greek he never afterwards improved it by any systematic course of study. . . . 'When I began my experiments,' he tells us, 'I knew very little of chemistry, and had, in a manner, no idea of the subject before I attended a course of lectures at an academy where I taught.'"[2]

In the Nikolaischule at Leipzig, says Richard Wagner, "I was relegated to the 'third form' after having already attained to the 'second' in Dresden. This circumstance embittered me so much, that thenceforward I lost all liking for philological study. I became lazy and slovenly."[3]

At Leipzig, Goethe rarely attended the lectures. "Nominally he was still a student of law, but actually

[1] *Letters from a Citizen of the World*, Bohn's Library edition, p. 100.
[2] *The Works of Henry Lord Brougham and Vaux*, 1873, Vol. I, p. 70.
[3] *Prose Works of Richard Wagner*, translated by William Ashton Ellis, London, 1899, Vol. I, p. 5.

he devoted all his hours of study to the whole wide realm of fine arts and *belles-lettres*."[1] The university professors to whom he showed his poems could see nothing of value in them, and "the poet was seized with rage and contempt for everything he had ever written in poetry and prose, and he mercilessly threw almost all the fine things which he had brought along from Frankfurt into the fire."[2] When the time for taking his doctor's degree arrived he failed because his thesis was unsatisfactory, and so he was obliged to be contented with a license.

Henry Ward Beecher at ten years of age, according to his sister, Mrs. Stowe, "was a poor writer, a miserable speller, with a thick utterance, and a bashful reticence which seemed like stolid stupidity. . . . He was not marked by the prophecies even of partial friends for any brilliant future. He had precisely the organization which often passes for dullness in early boyhood. He had great deficiency in verbal memory—a deficiency marked in him through life. . . . In forecasting his horoscope, had any one taken the trouble then to do it, the last success that ever would have been predicted for him would have been that of an orator. 'When Henry is sent to me with a message,' said a good aunt, 'I always have to make him say it three times. The first time I have no manner of an idea more than if he spoke in Choctaw; the second, I catch a word now and then; by the third time I begin to understand.' . . . The other children memorized readily and were brilliant reciters [of the catechism], but Henry, blushing, stammering, confused, and hopelessly miserable, stuck

[1] Albert Bielschowsky's *Life of Goethe*, trans. by W. A. Cooper, Vol. I, p. 73.

[2] *Ibid.*, pp. 46–47.

fast on some sandbank of what is required or forbidden by this or that commandment, his mouth choking up with the long words which he hopelessly miscalled, was sure to be accused of idleness or inattention, and to be solemnly talked to, which made him look more stolid and miserable than ever, but appeared to have no effect in quickening his dormant faculties."[1]

William Cullen Bryant's father, disgusted with the rhymes of his ten-year-old son, once said, "He will be ashamed of his verses when he grows up."[2]

Complaints of Emerson's scholarship in college reached the ear of the head master of the Latin school in which he had prepared. "He came to see me in my room once or twice," said Emerson, "to give me advice of my sins of deficiencies in mathematics in which I was then, as I am now, a hopeless dunce."[3] One of Emerson's classmates has left on record that Emerson knew less about the text-books than many of them, but far more concerning literature.

Pasteur, as a boy, was not at all remarkable in scholarship, and when he attended the Collège Communal at Arbois "he belonged merely to the category of good average pupils."[4] "Books and study had little attraction for him, and he preferred to follow his favorite pastime of fishing, and to delight his companions and neighbors by sketching their portraits, some dozen of which are still shown with pride by the inhabitants of Arbois."[5]

[1] *Biography of Henry Ward Beecher*, by Wm. C. Beecher and Samuel Scoville, pp. 65 and 70.
[2] *A Biography of William Cullen Bryant*, by Parke Godwin, Vol. I, p. 23.
[3] *A Memoir of Ralph Waldo Emerson*, by James E. Cabot, Vol. I, pp. 54–55.
[4] *The Life of Pasteur*, by René Vallery-Radot, trans. by Mrs. R. L. Devonshire, Vol. 1, p. 9.
[5] *Pasteur*, by Percy Frankland, p. 10.

"I first remember Thackeray as a pretty, gentle boy at the Charterhouse," wrote one of his friends. "Though he staid there several years, he never rose high in the school, nor did he distinguish himself on the playground."[1]

Shelley's interest in poetry seems not to have been awakened until toward the close of his school life at Eton.[2]

Daniel Webster "could learn anything if he tried. But with all this he never gained more than a smattering of Greek and still less of mathematics."[3]

John Adams developed very slowly. No one suspected his ability until he was well advanced in middle life.[4]

At Eton, Gladstone gave no evidence of unusual ability.[5]

In the Boston Latin School, Charles Sumner "seems to have been more remarkable for knowledge acquired by general reading than for striking ability."[6] His class standing was respectable, but that is about all that can be said for it. In college "he gave himself up to the studies that he loved."

Salmon P. Chase "was only a moderate student and took no high rank in college."[7]

At fifteen years of age Coleridge wanted to be a shoemaker—and almost succeeded, and two or three years later he just escaped medicine,[8] so little had his literary ability revealed itself to him or others.

[1] *Life of W. M. Thackeray*, by Merivale and Marzials, p. 46.
[2] *Life of Percy Bysshe Shelley*, by William Sharp, p. 30.
[3] *Daniel Webster*, by Henry Cabot Lodge, p. 16.
[4] *John Adams*, by John T. Morse, Jr., p. 4.
[5] John Morley's *Life of William E. Gladstone*, Vol. I, p. 30.
[6] Moorfield Storey's *Charles Sumner*, p. 5.
[7] Albert B. Hart's *Salmon P. Chase*, p. 5.
[8] *Life of Samuel Taylor Coleridge*, by Hall Caine, p. 19.

Ferdinand Brunetière, the late president of the French Academy, after having completed the course at the lycée Louis-le-Grand, failed in his examinations for admission to the Ecole Normale.[1]

As a small boy Watt was the butt of his playmates who jeered at his dullness. In the commercial school which he attended he was neither punctual nor industrious.[2]

John Ledyard, given up by his family in America as a hopeless ne'er-do-well,[3] shipping as a corporal of marines with Cook on his third voyage round the world, a deserter from the British Navy during the war of the American Revolution, afterwards the friend of Robert Morris, Paul Jones and Jefferson, begged for a ship in which he might explore the Pacific coast from New Spain to Alaska, and in the hope of accomplishing his purpose he tramped more than twelve hundred miles in the mid-winter of northern Europe. "All that Lewis and Clark succeeded in doing for the West, backed by the prestige of government, Ledyard, the penniless soldier of fortune, had foreseen and planned with Jefferson in the attic apartments of Paris."[4]

John Howard "was never able to speak or write his native language with grammatical correctness;"[5] and this, too, after he had spent seven years in a grammar school and, in addition, had been "for a time under the care of a Mr. John Eames, a man of considerable reputation, and tutor in philosophy and languages at a dissenting academy in London."

[1] *La Grande Encyclopédie;* also *Atlantic Monthly*, April, 1907.
[2] *The Life of James Watt*, by James P. Muirhead, p. 17.
[3] A. C. Laut's *Vikings of the Pacific*, p. 244.
[4] *Ibid.*, p. 262.
[5] Edgar C. S. Gibson's *John Howard*, p. 4.

David Hume's mother, to whom Hume refers as "a woman of singular merit," has left on record her opinion of her illustrious son. "Our Davie's a fine good-natured crater, but uncommon wakeminded."[1] Her mistake was probably due to the same cause that so often leads to the misjudgment of children—inability to see that they are thinking about things outside of our field of vision. It is easy to understand how a "practical" woman, such as Mrs. Hume seems to have been, should have doubted the quality of her son's speculative mind. At all events during his school training Hume "won no special distinction,"[2] and perhaps this again was the result of his mental superiority, which forbade him to think in "approved" grooves.

In speaking of his intellectual traits in boyhood, Herbert Spencer says, "My memory was rather below par than above, in respect both of quickness and permanence. . . . A related fact is that throughout boyhood, as in after life, I could not bear prolonged reading. . . . While, however, averse to lesson-learning and the acquisition of knowledge after the ordinary routine method, I was not slow in miscellaneous acquisition."[3] Spencer's native antagonism to the rote method was so intense that it prevented him from making any substantial progress, during his school course, in the grammar of his own or foreign languages. His mind was of the non-conforming sort, as indeed all superior minds are, and school organization has not yet been sufficiently perfected to take them into account.

Two small boys were rivals for the last seat on the last bench in their school room. It was difficult to tell

[1] Thomas Huxley's *Life of Hume*, p. 2.
[2] Henry Calderwood's *David Hume*, p. 14.
[3] *Herbert Spencer's Autobiography*, Vol. I, pp. 91–92.

which was the poorer scholar, because they both stood so low and were running, most of the time, neck and neck. When, in after years, these two dunces met, one of them, Wilhelm Reuling, had become leader of the Imperial Opera in Vienna, and the other, Justus von Liebig, a chemist of world-wide fame.[1] Liebig himself has told how the director of the gymnasium that he attended once visited his class and after observing his wretched work, told him that he was the plague of his teacher and the sorrow of his parents, and asked him what he thought would become of one so inattentive and indolent.[2] When young Liebig replied that he would become a chemist, the director and school burst into an uncontrollable fit of laughter. Liebig's class-work continued so unsatisfactory that his father was obliged to remove him, and, in despair, apprenticed him to an apothecary, but after ten months, as Liebig says, the pharmacist grew so tired of him that he sent him home. Liebig has suggested one reason for his poor success in school. He had scarcely any auditory memory, and could retain little or nothing of what he heard. Yet his teachers never found this out, and his boyhood was sacrificed to their ignorance.

The diploma which Henrik Ibsen[3] received from the Christiania high school represented the lowest grades which would admit of graduation. Even in the Norwegian language his marks indicated only moderate standing.

M. Pierre Curie,[4] late professor of physics in the Uni-

[1] See *Oration* by Professor August W. von Hofmann at the unveiling of Liebig's monument in 1890; Künzel's *Grossherzogtum Hessen.*

[2] *Deutsche Rundschau*, Vol. 66, p. 30.

[3] *Das Echo*, June 26, 1907, p. 2119. (Quoted from the *Berliner Neueste Nachrichten.*)

[4] *The Westminster Gazette*, April, 1906.

versity of Paris and co-discoverer, with his wife, of radium, was so stupid in school that his parents removed him and placed him under a private tutor.

These are a few of those whose subsequent careers demonstrated the inadequacy of the usual standards as tests of ability. The writer has others in his list, but it seems needless to continue the roll.

The reader of these biographical notes certainly cannot fail to be impressed with the great diversity of causes underlying the superficial dullness. So far from being a simple condition of mental obtuseness, dullness, evidently, is an exceedingly complex state, varying widely in different persons. The biographical notes naturally include only those whose success has been sufficient to warrant chronicling. Assuredly there are others whose native endowment is so slight as to doom them to occupations requiring little intellect. To put with these latter those whose backwardness is a state of unawakened mental power, or occasioned by remediable pathological conditions, is only to habituate them to dullness. Clearly segregation *en masse* is bad educational policy. In each case the question is, what lies back of the seeming intellectual obtuseness. Is the cause physical, or mental, or developmental? Or, again, may it rest on unsatiated interest in things little thought of in our schools?

In some of the cases cited certain elements contributing toward the situation are evident. Liebig's auditory memory was strikingly defective. Since much school instruction is given orally this defect alone would be sufficient to cause loss of interest, discouragement and inattention, with the accompanying superficial stupidity.

A university professor recently told the writer that

when a boy his power of visualization was so strong that he could read a book through the night before his examination, and the next day, as he wrote, he could see any page in detail on his desk before him. His answers were thus almost copies of the text. At the end of three months of Euclid he received a mark of about five on a scale of one hundred. He then began to read it over the night before the examination, and at once brought his mark up to seventy because of his ability to visualize, though, as he himself says, he never had any mathematical ability.

Another, a university student, when a boy, could visualize the entire work of any arithmetical problem that had been put on the blackboard.

It is needless to speak of the great disadvantage at which a motor-minded boy works with such classmates, especially when we remember that school work is carried on in such a manner as to distinctly favor the visual and auditory minded. It may be said that these cases are exceptions, but this is true only in the degree of their power. The important point is that children differ greatly in their way of getting and utilizing experience, and so dullness may express nothing more than the inability of children to immediately change their mode of reacting to the external world.

A public school superintendent informs me that a seven-year-old boy had been in the first grade two years because, as his teacher said, he was too dull to go on. The superintendent placed him under another teacher, and at the end of the year he was leading his class. In the first school a phonetic method was used, and as the boy could not get auditory images he made no progress. As soon as a visual method was employed he be-

came bright. In the experiments made by the writer in the psychology of learning, and given in another chapter, it was continually evident that the visual, auditory, and motor-minded only imperfectly share in the experiences of one another, and in some instances such participation is absolutely impossible. It cannot be doubted that many times these mental differences are the basis of "dullness."

In other instances, as shown by the biographical studies, dullness is the effect of absorbing interest in objects and phenomena beyond the range of current education. This is clearly seen in Darwin, Linnæus, Fulton, Joseph Banks, John Hunter, Humphrey Davy and Watt.

The teacher of one of the "dull" divisions in the Worcester (Mass.) public schools says that these children are the keenest to bring specimens and they know more about the life of animals and plants than her "best" division. They all seem to want to know how things are done, and they can always be relied upon to do anything requiring action. In another "dull" group several are greatly interested in animals. Three others like to work in electricity and one of these is absorbed in it. He goes to the electric car barn to study the plant, crawls under the cars to examine the motor, and frequently runs the cars.

The rigidity of our educational organization is a serious menace to mentation. Children must do certain tasks at set periods, regardless of their native trends and momentary inclination, and so we lose the support of childhood's enthusiasm and put ourselves directly in opposition to it, with the friction of monotony. The paths of approach are so numerous that the sub-

jects of study might be reached from any point of individual preference, and in this way be made centres of educative forces for children of widely diverse interests, were not the system too stiff to bend to the needs of individual dispositions. To make the native endowments of children the point of departure in their training, instead of always trying to strike fire at zero temperature, and to have an organization so flexible that the moment of childish enthusiasm for an idea could be seized, regardless of what comes next in the programme, would be a long step in educational progress. It is more than regrettable that in schoolish zeal for the accomplishment of set tasks the supreme value of selective discrimination for different natures has been denied. Many tasks were better not done by some children. To force them only engenders hatred for the subject, and the conservation of enthusiasm is vital for the symmetry of the psychic life.

Then, again, the varying rates at which children mature make some seem stupid. George Eliot, Harriet Martineau, John Adams and many others are known to have matured exceptionally slowly. But precocious mental development is not always permanent. It is well known that aboriginal children learn quite as readily as children of European parentage, but it does not last. Mathews says that "for three consecutive years the aboriginal school at Remahyack, in Victoria, stood the highest of all the state schools of the colony in examination results, obtaining 100 per cent. of the marks, but the limit of the natives' range of mental development is soon reached."[1] The Andamanese,

[1] *Review in Nature*, Vol. XLIII, 1890, p. 185, of *Report in Journal*, and *Proceedings of the Royal Society of New South Wales*, Vol. XXIII, part 2.

thought by some to be the little dwarfs whom Sinbad met in his fourth voyage, are certainly hideous little creatures. Man, who lived among them for some years, says that when he first arrived they did not know how to make fire and had no word for numbers above two, nor could they by any device count above ten. Yet, a little later, according to the same authority, these aboriginal children kept pace in the schools with children of European parents until they were ten or eleven years old, but at this age their mental development seems arrested,[1] and Brander says that "up to twelve or fourteen they are as intelligent as any other children."[2] Rennie once declared, referring to the Maori children, that it was "rather an exceptional white boy who came up to their average."[3] But they also, later in life, do not maintain this standard. Pilling[4] assures us that the children of the Cherokee Indians learn to read in two and one-half months, using a sort of syllabary invented by a half-breed Cherokee, "the son of a Dutch pedler and Cherokee mother, an illiterate vagabond," who, according to reports, could read neither his own nor any other language. Stetson[5] tested the memory of five hundred colored and five hundred white children in the Washington public schools and obtained practically the same result from both groups.

There seems to be a substratum of ability which, in its undeveloped state, does not differ greatly in children and is more fundamental than the special, accessory

[1] *The Aboriginal Inhabitants of the Andaman Islands*, by Edward Horace Man, London, 1883, p. xxi.
[2] Quoted by De Quatrefages in *Les Pygmées, Journal of the Anthropological Institute*, Vols. VII and IX.
[3] *Macmillan's Magazine*, Vol. LXXIX, p. 40.
[4] *American Anthropologist*, Vol. VI, p. 183.
[5] *Psychological Review*, Vol. IV, 1897, p. 285.

powers that rise from it. It is the racial mind persisting in the individual, and the expansion of this deeper mentality, with its unquestionably varying individual possibilities, is the chief function of school during early childhood. It is more than any talent because it is the matrix of them all, and well-rounded manhood, the proverbial "level head," depends on its symmetrical and unarrested growth.

The power through which a potentially strong mind excels, and which is truest to its nature, rarely lies near the surface. The boy himself is usually not conscious of it. Excellent mental endowment often differentiates slowly, but, as we have shown, there is every reason for believing that its expansion is very often unnaturally delayed by the narrowness of the enclosure within which the educational machine holds it. But, just as native indolence saves children from the pernicious good intentions of their teachers, so the waywardness of the mind, which makes it jump fences and seek new pastures, more alluring, perhaps, because the manner in which they shall be nibbled has not been settled by ancestral convention, comes to their aid and saves many from permanent arrest.

The contention that it was, after all, being compelled to study the subjects in the course that made the men and women referred to in this paper successful, is hardly admissible, since, in most cases, they simply did not study them. According to the school standards they were negligent, indolent and dull, but theirs were too forceful natures to be satisfied with a narrow range. In their seeming indolence and mental instability they were testing themselves, not consciously it is true, but in response to vague organic promptings. It is likely

to be the superficially precocious, whose mental endowment is not very selective, and so incapable of the loftier moods or greater intellectual achievements, who can adapt themselves without inward revolt to a prescribed and confined course. The others are restless in constraint. Their minds call for a greater variety and more freedom to do things in their own way. It is a sort of psychic ebullition, and each new bubble is a point of contact with the struggling mind below. This is the teacher's chance. He should help children to learn to know themselves, and the hottest place in the seething caldron is the point of greatest efficiency at that moment. Good boys, who easily fit into the school mould and always do just what their teachers desire, rarely seethe; they only sizzle.

We have, then, accepted too readily the verdict of school studies. They require a certain specialized ability, just as puzzles do, but it does not follow that those who cannot do them successfully are dull. The range of human experience and activity is not exhausted by the curricular stock of studies, and the number of men who have become eminent without initiation into their mysteries shows that their badge of membership is not necessary for success. Life cannot be interpreted in terms of English grammar, Latin or mathematics, in spite of those who insist that a boy must parse his way to salvation.

All children are exceptional, and it is this varying personality that makes the life of the educator alike so fascinating, and so perplexing. It is quite certainly impossible in childhood, and probably in early youth, to determine who are the permanently bright, because at these ages special abilities of individual inheritance

have not differentiated. It is the period of racial inheritance. For this reason every young child must be regarded as a possible genius. The function of the educator then, while elaborating to the fullest extent the basal racial characteristics, is to enter so completely into the lives in his charge that he may discover each new variation at its emergence.

The problem of development is not simple and there is no "universal" method. The school-master has settled upon certain "essentials" for mental growth, or rather, they have come down to him from different periods since the Middle Ages, and he has fancied that their "necessity" is wrapped up in the nature of things, and so he uses up much energy in keeping children of widely varying endowments in the scholastic trail. Meanwhile the Patrick Henrys laugh at him in their indolence, the Wordsworths give thanks that he left them alone, and the John Hunters literally take to the woods.

CHAPTER II

CRIMINAL TENDENCIES OF BOYS; THEIR CAUSE AND FUNCTION

One of the most interesting chapters in the history of education, as well as of ethics, is the evolution of the idea of sin. Cotton Mather,[1] lovingly and fearfully impressing her natural depravity upon his five-year-old daughter, is a curious picture of domestic pathos. That was certainly an oppressive moral burden which the hereditary sin of Adam put upon man. Fortunately for the peace of mind of parents, as well as of children, our interpretation of sin has greatly altered since the time when Calvin taught[2] that the nature of children is odious and abominable to God, and Jonathan Edwards proclaimed them to be "young vipers, and infinitely more hateful than vipers to God."

Investigation of the lives of reform-school boys always leaves the impression that, with possibly a few exceptions, they are quite representative of the average active, normal boy, and the investigator usually ends his work with the overwhelming conviction that, after all, probably the only reason why he and his boyhood associates did not graduate from the same sort of institution was the difference in their environment. It

[1] *Diary*, quoted in Barrett Wendell's *Cotton Mather*.
[2] *Institutes of the Christian Religion*, Vol. I, p. 229.

was with this feeling, occasioned by conversation with the boys confined in the Wisconsin Reform School, and by a careful study of the "history book" of the institution, that a *questionnaire* was prepared and sent to men of various occupations.

Answers were received from forty-three teachers, including college and normal school professors, twenty-five college students and senior students of a state normal school, and thirty-five of a miscellaneous class, including lawyers, ministers, dentists, merchants, etc.

The answers are not classified in percentages, as no such mathematical accuracy can be attributed to them. But conversation with many men since the completion of this investigation has strengthened the conviction formed at that time that they are a fair average of what the boyhood of many conscientious moral men has been. If the results err at all, it is not in exaggeration of criminal acts, but rather in the incompleteness of their enumeration.

I. Larks and adventures play a large part in the life of most boys of an active and initiative nature, and there seems to be a keen enjoyment of feeling independent of law. Of the forty-three teachers, thirty-three said that they enjoyed larks and adventures as boys, while four enjoyed them "if they were not too risky." Twenty-nine liked the excitement of doing what was forbidden, while twenty-six gloried in the thought of being outside the realm of law. The following indicate the general tone of their replies:

I am satisfied as I look back upon my boyhood that the only thing that kept me from going farther was fear of the law. I liked to be independent of it, and wanted to be, but usually I was afraid of it.

If the law was liable to catch me I usually refrained.

About the same proportion of students and a rather larger proportion of the miscellaneous group gave similar answers.

I probably would have enjoyed them had I had a chance.
I was too sickly to engage in any, otherwise I should have enjoyed them.

II. Truancy. Running away from home may begin as soon as the child is able to walk, and the impulse sometimes continues active in one form or another through childhood, or even into adult life. The desire to run away from home is not confined to boys in unpleasant surroundings. In a class of twelve or fifteen boys, whose homes are all that could be desired, half a dozen or more will be found who planned more than once to run away. The writer has a distinct recollection of partially arranging to leave home several times. The exciting cause is commonly some book of adventure in which a boy plays a striking part.

This wandering tendency seems to be a survival of the migrations of primitive races.

The migratory instinct of animals is too well known to need more than passing notice. This instinct probably had its origin in the search for conditions suited to the animals' wants. The chief cause of migration has been the search for food.[1]

"The young salmon which is born in a mountain stream is soon impelled, by something in its nature, to journey downward, even for many hundred miles, until it reaches the unknown ocean, where it would discover, if it had faculties for anything so subjective as dis-

[1] Wallace's *Geographical Distribution of Animals*, Vol. I, p. 25.

covery, that, while it was born in a little brook, it was made for life in the great ocean." [1]

"The migratory instincts of the northern hares and squirrels, and more particularly of the Norway rat and lemming, which in severe winters move in amazing numbers in direct lines over lake, river, and mountain, overcoming all obstacles that might be placed in their path, are well known." [2]

"The Kamchatka rats, under the pressure of numbers, are stated by Pennant to travel westward for a distance of eight hundred miles or more." [3]

"Turtles, during the ovipositing season, move in considerable numbers from one part of the sea to another, and they are stated to find their way annually to the Island of Ascension, which is distant upwards of eight hundred miles from the nearest continental land mass." [4]

The impulse inherited from their animal ancestors, strengthened by the need for abundant food, has firmly implanted in the race the desire to roam.

The home of primeval man in palæolithic times "was along the shores of seas and the banks of streams. Up and down these natural highways he pursued his wanderings, until he had extended his roamings over most of the habitable land." [5]

"What prompted him and all savage tribes is not always the search for food. The desire for a more genial climate, the pressure of foes, and often mere causeless restlessness, act as motive forces in the move-

[1] W. K. Brooks: *Popular Science Monthly*, Vol. LII, p. 784.
[2] Heilprin: *Distribution of Animals*, p. 40.
[3] *Ibid.*, p. 40.
[4] *Ibid.*, p. 41.
[5] Brinton: *Races and Peoples*, p. 74.

ments of an unstable population. Certain peoples, as the gypsies, seem endowed with an hereditary instinct for vagabondage. The nomadic hordes of the Asiatic steppes and the wastes of the Sahara transmit a restlessness to their descendants which in itself is an obstacle to a sedentary life." [1]

During early geological periods, a strip of land connected France with England, and here, in his wanderings, man probably crossed over from the continent.[2]

Tramps and gypsies furnish examples of the persistence of this slowly disappearing race tendency to migrate. Many men become tramps because the impulse in them to wander is so strong that they cannot resist it.

Truancy is not evidence of youthful depravity. It is temporary reversion to the migratory habits of our ancestors. It is the awakening in the boy of the natural life of the race, and a revolt against the oppressive gloom of the schoolroom.

The following replies are from teachers:

Yes, I ran away from school as often as I dared until thirteen years of age.

No, but solely because I had more fun in school than out.

Yes, I never got over it in the schools.

III. Anger and Fighting. Anger probably arose as a substitute for reflex responses of the organism to pain. Hence it is one of the oldest elements in our psychical life. This accounts for its overwhelming force. Anger is physical,[3] not only in its primitive form, but also in its more complex manifestations. It is not caused by organic changes, but is the feeling of these changes.

[1] *Ibid.*, p. 75.
[2] *Ibid.*, p. 376.
[3] Lange's *Les Emotions.*

In anger, as in every emotion, "there is an initial fact, idea, image or sensation, but the emotion itself is nothing but a sense of those organic changes which precede and condition it." [1] Its control is dependent upon inhibiting nervous impulses. These inhibiting impulses may be reflexes of a low order, as when you immediately allay the anger of a fierce dog by giving him a piece of meat, or they may be of a higher kind resulting from ideas of retribution reacting on the individual, or, again, they may be of a still higher sort due to ideas of duty and responsibility. For this reason the conditions amid which a child is reared will have a strongly determining influence upon his control of himself. Among savages anger was allowed free vent. It was the means by which they "worked themselves up" for war. Doubtless it also served a useful purpose in making the timid courageous.

The justification for fighting among boys is not the need for self-protection, though it could be defended also on that ground. Its value, however, is psychical. Fighting, in some form, is one of the first means by which the mind becomes accustomed to intense action. To fight well, a boy must be capable of severe concentration of attention. He learns to judge accurately and quickly. "To do things quickly *and* well is more than to do them quickly *or* well." [2] Fighting develops self-control, as one never defends himself successfully in angry excitement.

It is a law of organic growth that tissue adapts itself to the tension to which it is put, provided, always, that the strain never increases suddenly beyond the strength

[1] G. Stanley Hall: *American Journal of Psychology*, Vol. X, p. 589.
[2] Baldwin's *Social and Ethical Interpretations*, p. 143.

of the resisting tissue. Bone "is composed of numerous fine bony plates so arranged as to withstand the greatest amount of tension and pressure, and to give the utmost firmness with a minimum expenditure of material." [1] "If it is broken and heals out of the straight, the plates of the spongy tissue become rearranged so as to lie in the new direction of greatest tension and pressure; thus they can adapt themselves to changed circumstances." This adaptation to strain is true also of muscular tissue, and probably of brain tissue. Rearrangement and development of brain substance in adaptation to psychical tension is the underlying principle of brain training. This is the physiological basis for the fact that the mind grows to the mode in which it is habitually exercised.[2]

Twenty-eight of the forty-three teachers had strong tempers, and twenty-two of these said that they were unable to control them. One answered, "usually, but when it got away from me I was wild. I tried to kill my brother once for tormenting me."

Another said, "I once killed a cow in a fit of anger."

"I was wild when angry," replied still another.

A college professor wrote, "I remember trying to kill my brother once by hitting him with a stone after he had tormented me."

Eighteen of the twenty-five students had strong tempers, and nine were unable to control them. Of the miscellaneous group there were twenty-seven out of thirty-three with strong tempers, and fourteen of these could not restrain themselves.

[1] August Weismann: *The Effect of External Influences upon Development*, p. 11.

[2] Carpenter's *Mental Physiology*, p. 470, and Swift, *Journal of Pedagogy*, Feb., 1900.

Eight teachers, three students, and five of the miscellaneous group remember seriously injuring a companion while angry. The following are representative.

I assaulted and nearly killed a boy who had snowballed me.

I injured my sister quite seriously.

I broke a boy's nose, dislocated his jaw, and nearly put out one of his eyes.

IV. Robbing orchards, vineyards, and stealing watermelons is almost universal with those who have any opportunity.

Only three teachers, two students, and six of the miscellaneous, answered, "No," and a number of these said that they had no chance.

Yes, I took great pleasure in it (teacher).

An interesting phase of these acts is the thought of vengeance which sometimes prompted them. It is the raiding spirit of primitive people.

I assisted in robbing the orchards and vineyards of the farmers of a neighboring town with which our town was at variance. Two or three boys, well mounted, would take a small quantity of apples, almost under the eyes of the farmers, and gallop away before the farmer could get after us. We did it to anger the people and *spite the town*, and not for the sake of the fruit, which we threw away along the road (teacher).

Most of those who engaged in such acts looked upon them as legitimate fun. Only eight teachers out of forty-three, six students out of twenty-five, and five of the thirty-five miscellaneous considered it wrong at the age when they were doing such things. Besides those who gave an explicit answer of either "legitimate fun" or "wrong," the following typical reply is suggestive:

The question of right or wrong did not come into my mind. I simply did it (teacher).

The following illustrates the youthful idea of punishing stinginess and righting a felt injustice:

I did it because I thought it fun to see the owner get angry. He had melons to feed to his hogs, but would not give us boys any, so we helped ourselves (teacher).

Children draw fine distinctions between wrong acts, and so justify themselves in doing something that is *not very wrong*, though they may admit that it is not quite right.

I distinguished between taking money, real stealing, and taking fruit (teacher).

I only partially regarded it as stealing (teacher).

I did not consider that I was injuring any one to any great extent, and I was bringing enjoyment to myself (teacher).

I considered it wrong, but I reasoned that it was *not very wrong*. I wanted the fruit, and took it because I wanted it, rather than for the excitement. I thought it not so bad as taking other things (teacher).

I regarded it as wrong, but not wicked (college student).

I thought it belonged to me if I could get it without being caught (miscellaneous).

V. Taking things secretly from parents, brother, or sister seems to be quite common, the feeling apparently prevailing that appropriating property of members of the family is not quite so bad as taking it from others. Besides, if caught, so severe a penalty will not be inflicted.

Yes, I took cigars. I did not smoke them, but traded them for things I wanted (teacher).

Yes, too numerous to mention (miscellaneous).

I took anything I wanted (miscellaneous).

I stole a ring from my sister and gave it to another girl. I did not admit it for three or four years (miscellaneous).

A special phase of this which probably prevails to quite an extent is illustrated by the following:

Taking things from my brothers I viewed in the light of war-

fare, and I felt that it was getting ahead of them. I did not feel that their ownership amounted to much, or that there was any particular wrong in disregarding it (teacher).

VI. Other escapades, of too varied a character for classification, include such acts as interfering with trains by flagging, greasing the rails, obstructing the track, throwing stones through the car windows, stealing old iron or coal, etc. Here, as throughout this chapter, the acts were committed in early boyhood, and up to about fifteen or sixteen years.

I got drunk, stole things from a store, and carried a pistol and fired it (teacher).

In company with another boy I stole some oranges from the stand in front of a store (teacher).

I threw a cord of wood into a cistern used by a family (teacher).

I once stole a book, that irresistibly attracted me, from people whom my parents were visiting. The theft was never discovered (teacher).

I took various articles from stores (teacher).

I once stole a thimble from a pedler, and, at another time, some fruit from a store. The last troubled me so much that the next day I bought some fruit there and, unseen, laid the money on the counter for what I had stolen the day before (teacher).

I stole from news-stands (teacher).

I stole railroad iron and explored other people's back yards to see what I could find to take (student).

I took a wheel from a man's buggy (merchant).

I turned in fire alarms (dentist).

I obstructed highways and railroads (locomotive engineer).

About twenty of us created a disturbance for which we were arrested (teacher).

I stole mill files (merchant).

I stole fruit and nuts from a fruit stand (teacher).

We boys often went out on what we called "cooning expeditions," stealing things lying around (teacher).

I stole fruit, marked a house all over with red paint, tore up sidewalks, and threw tin pails filled with stones at houses (teacher).

I stole two barrels of tar for a fire from a tar manufacturer, and I used to throw stones from a hill down upon some Italian work-

men. I might have killed some of the men, as I did not select the smallest stones. We boys used to turn the street-car switches so as to send the car up the wrong track (teacher).

I stole things from a locked house in which they were stored (teacher).

One Sunday evening, in company with other boys, I stole a railroad hand-car and ran it off down the track (teacher).

I stole some iron wheels from a farmer's machine (teacher).

I uncoupled cars standing on side-tracks when they were being switched upon other tracks. Then I hid to watch and hear the brakemen swear when they found the cars left behind. I also threw over wood piles, tore down fences, and greased the railroad track to stop the train (teacher).

I set fire to my uncle's barn to see it burn. With the help of other boys I put the carriage of a teacher upon the roof of his barn (teacher).

I set fires in woods to see them spread (teacher).

I pulled a farmer's wagon a long distance away, and set the brakes on a through freight train so that I could get off (teacher).

I stole a man's horse and buggy, and was gone four days before he got track of me. With other boys I ran off with a hand-car, and when we heard, in a neighboring town, that the company's agents were after us, we left the car and ran away (teacher).

I turned in false fire alarms for fun and placed large rocks on the street-car track (student).

I shot through the windows of empty houses with a revolver (student).

When eight or nine years old, I was taken into a beautiful park in Chicago, and, while unnoticed, I stamped my foot into the midst of a beautiful flower bed (teacher).

I sold eggs and kept a part of the money with which my parents expected me to buy groceries. This was frequent up to my fifteenth year (student).

I stole chickens, rabbits, fruit and cigars (student).

I burned buildings, stole fruit from stores, and often greased railroad rails (barber).

I pushed an outhouse over a bank upon a flat car below, and then started the car down the grade. I also put a railroad spike upon the track on a heavy grade for a flat car loaded with men to bump over as it shot down the grade (merchant).

I broke into our schoolhouse through the window, and tore up and carried away some books and pictures. At about fourteen years of age I hired a boat, intending to go to Milwaukee. When about six miles away I left it and went off on foot. I do

not know whether the owner ever recovered the boat or not (lawyer).

As a college student I stole a very valuable pair of elk horns from a front hall. I also blew up with powder an unused gas tank belonging to the city gas company (manufacturer).

I stole powder from a quarry and took a hand-car many times from the roundhouse, and after using it I left it on the track anywhere (merchant).

I broke into a house while the occupants were at church and stole a lot of things to eat (farmer).

I cut off a horse's mane and tail and painted him. At another time I pushed a fine carriage into a ravine and smashed it (dentist).

I switched a train from the track and set fire to beds to get removed from one school to another (searcher of records).

In company with other boys I greased the rails to see the train stop. Several of the boys were afterward sent to the reform school (teacher).

Several of us boys stole old iron from the scrap-pile of a tin shop and sold it at a foundry. We did not do this so much for the money as to see if we could do it without being detected (teacher).

I drank and gambled as a boy. On numerous occasions I tipped over small houses having blocks for a foundation. A family was living in one of them at the time. I was arrested several times (lawyer).

I was one of a crowd of boys who put obstructions on the railroad (locomotive engineer).

I stole rags and sold them again. On one occasion I sold the same lot of rags three times. I also stole copper bottoms from boilers in yards, where they were placed to dry, and sold them. At one time I struck a policeman, who was about to arrest me, on the head with a mattock, and nearly killed him (merchant).

In company with others I stole lead pipes from new buildings. We cut the lead and melted it. Detectives were employed, and so we quit. I frequently stole rabbits and pigeons (merchant).

I forged my mother's name to a note asking for samples of cloths and prices, and presented it at the store when most of the clerks had gone to dinner. The object was to occupy the clerk's attention, while a friend, who has since served a term in the penitentiary, stole things from the store. Some of us boys broke into a store at night and stole bottles of pop. We afterward took back the bottles and received pay for them as empty pop bottles (skilled machinist).

I stole turkeys from farmers (teacher).

I stole fruit and nuts from fruit stands (teacher).

I stole coal and iron from the railroad, and tried once to pass a counterfeit five-dollar bill. I knew it was counterfeit (teacher).

I smashed signs and did general damage. I was seldom or never the one who did the deed, but I was one of the gang (teacher).

I dropped a stone down a mining pump causing a smash-up and assisted two other boys in breaking a flood gate (student).

I greased rails to stop a train and set fire to dry grass in a pasture, and it burned over nearly the whole pasture. I also stole candy from a store (student).

In the region in which I lived as a boy, nuts were held to be as strictly private property as fruit, and I made a practice of stealing them. In some cases I sold them at a store for several dollars. I felt that this was legitimate poaching, not even so bad as stealing fruit, in which I nevertheless engaged. In taking nuts the fun was a fully equal motive with the gain (teacher).

In company with another boy I once tied a handkerchief to a stick, propped it up on the railroad track, and stopped a freight train. It was exciting sport, which we enjoyed keenly because we imagined it was such a daring infraction of law (teacher).

I used to steal iron from a pile at a hardware store and sell it. I would then steal it from those to whom I had just sold it, and sell it at the hardware store from which I first stole it (teacher).

I stole old iron from the railroad track, but I did not dare sell it, because I had it from tradition among the boys that the buyer would expose me (teacher).

There is a decided feeling among boys that what they find, or overchange given them by mistake, belongs to them.

I did not return a $2½ gold piece that was given me by mistake for a ten-cent piece. I knew what it was when it was given to me (teacher).

Yes, I have found articles of value, and I always considered such things the finder's property (teacher).

I would not have tried to find the owner had I found anything (student).

I found money in a pocketbook. I did not try to find the owner (lawyer).

I once found $5. I thought I knew to whom it belonged, but I felt that he could afford to lose it, and I considered it a kind of godsend (searcher of records).

I found a $5 bill for which I did not seek the owner (merchant).

I picked up a gold sleeve button of quite a little value, and a woman's breastpin. I laid them away (teacher).

About one-half of the several groups admit that they drank intoxicating liquors while boys. The question, "Were you ever drunk while a boy?" was conspicuously unanswered. Seven teachers, four students, and fifteen of the miscellaneous group said that they were.

I enjoyed the excitement, and thought it manly (teacher).

VII. The most serious offence with which the *questionnaire* dealt was stealing money. The subject was divided into two parts, taking money from parents and from employers.

About one-fourth of the teachers said that taking money from their parents was a more or less common occurrence. One-half of the students and about two-thirds of the miscellaneous group made the same admission. A good number had no chance, but are sure that they would not have hesitated had opportunity offered.

A university professor wrote in reply:

I do not remember ever taking money from any person. I cannot now account for my scruples on that score, but I suspect that I saw some boys very severely punished once for taking money, and I unconsciously came to the conclusion that it was not a safe thing to steal. I know that I would not have hesitated to take anything which I wanted from my brothers or any one else, when I was seven or eight years old, if I felt reasonably sure that I should not be detected, but I was afraid to take money.

I stole money in small amounts, usually fifty cents at a time, from the cash drawer of my father's store whenever I wanted it (teacher).

I used to keep part of the change when I was given money to buy things for the family. I saved up twelve dollars in this way to redeem a pledge for the payment of a bill about which my parents knew nothing (student).

I took money whenever chance offered (student).

Once I took as much as five dollars (teacher).

I took as much money as I thought would not be missed, usually fifty cents or a dollar. Once or twice I took larger sums, according to what I wanted to get with it (merchant).

I took money in small amounts whenever I needed ammunition for my gun (student).

Almost all agreed that they divided stealing into degrees of wickedness. Few regarded taking money from their parents as very bad. The following are from teachers:

I did not think it exactly stealing.

I looked upon taking money from my parents as different from taking it from others.

I did not consider it stealing.

I knew it was stealing, and I would not have dared meet my parent's sorrow had they learned of it. Still I kept it up. As I look back over such acts I am certain that I never really faced the question of right or wrong. I simply did it.

From one-fifth to one-fourth of the several groups acknowledge taking money or articles of value from employers. When it is remembered that not all of those who were questioned had worked for others than their parents, this proportion becomes a large one.

The growing feeling of part ownership is illustrated by the following from a college professor:

As I now look back upon a period of twelve years' service, from nine years of age to twenty-one, I see how the feeling that I was part owner in everything steadily grew, and I would then make use of various small things without much thought about it; but still I kept the fact secret. Such things never amounted in value to over twenty-five cents at one time, and it was never money or clothing.

When a close-fisted employer refused to let me have my clothes at cost, I pocketed enough of his change to bring my clothes down to the cost mark (student).

The following is from one who has lately entered the ministry, but who, at the time referred to, was a clerk in a drug-store:

I appropriated to my own use, without paying for them, toilet articles and other things.

The efforts of boys to satisfy their conscience and still enjoy the pleasures of an act in which they half feel they should not engage, is shown in the following from a teacher:

When a boy I worked in a candy store, and I consumed a good deal of candy without letting the proprietors know that I did it. I reasoned that it was expected that a clerk would eat about a certain quantity, and that it could not be wrong under these circumstances. My point of conscience was how to gauge this customary amount, and I think I fixed it at about all the candy that I wanted.

The amounts of money taken were usually small, but in one case as much as ten and twenty dollars were taken at a time.

It is not uncommon for some children who would not themselves steal to be willing, nevertheless, to reap advantage from the thefts of associates.

Indirectly I encouraged others to steal. I obtained things which a boy of my own age wanted, and traded and sold them to him. He gave me money for some, and articles out of his father's store for others. I did not know positively that he took these things without his father's knowledge, but I had good reason to suppose that he did. I never inquired into the question. If I had known that he stole them I should have continued trading (teacher).

The reasoning varied by which those who took money or articles of value from an employer justified themselves, but frequently there seemed to be an attempt to satisfy their conscience. Sometimes a sense of injustice, real or imagined, suggested the theft.

I was led to take money, etc., by telling myself that my employer was not paying me enough, that he had no right to make money on the few things that I wanted for my own person, and by remembering that he himself had taught me to deceive his customers (student).

I thought that I was not receiving enough pay for my work (teacher).

I took things from the store in which I worked because I thought that I had earned them (teacher).

I thought that if my employer would pay me more I could afford to buy the paper and other things that I took (printer).

At other times the thought of justification did not enter the boy's mind. He did not face the question of right or wrong. He simply appropriated the articles or money.

I did not try to justify myself. I wanted the things and I took them, though sometimes I took things which I could not possibly use (merchant).

I just took the money because I wanted it. I did not face the question "ought I?" (teacher).

Again, the morality of the act depended on the amount of money or value of the things taken.

I felt that it was so small that it would not amount to much (teacher).

I thought it would make no difference to the owner (teacher).

I stole candy on the ground that the owner was to feed me, and it was as cheap as anything else (teacher).

VIII. The great majority of those who expressed an opinion concerning the best way of dealing with lawless acts of boyhood believed that reasoning is most effective. Their own treatment as boys varied from reasoning to extreme severity.

Father punished me severely. I do not think it had a good effect (teacher).

Whipping I regarded as an outrage, and it made me insufferably rebellious (teacher).

My father was gloomy and severe when I committed acts that were in any degree public infringements. I consider reasoning better than punishment, but still better giving a boy such plays and active pursuits as will occupy his energy pleasantly (teacher).

My father was very harsh when I had done anything wrong. He told me how wicked I was and what a terrible place I would go to when I should die if I did such things. His method now seems to me to have been the result of a strict belief in original sin which must be whipped out or else driven out by horrible remorse. There was never any recognition of the fact that boys like excitement and do many things because they are normal boys. In his view every wrong that I did was done because I was wicked, not because I was a healthy growing boy. His method was decidedly bad (teacher).

IX. Saying what was not true to escape punishment was common. Sometimes parents unintentionally drive a boy into falsehood.

I was a persistent liar. My lying seems to me now to have been almost reflex, an immediate reaction to the stern questions of my father. He constantly frightened me into lying so that I finally came to tell falsehoods when there was no need for such protection (teacher).

A professor in an eastern college writes:

I, and my playmates generally, had no regard for the truth when an untruth was likely to save us from punishment.

Few of those who replied have any regret for the unlawful acts of boyhood. They seem to think them a necessary element in good physical and mental development. The following replies are typical.

They were wrong, but I should feel half sorry if I thought my boy could not do the same things (teacher).

They are natural things for boys to do (teacher).

Such acts are simply the expression of a general egoistic attitude toward other people (teacher).

I think all boys must have a few experiences of that sort (teacher).

Such deeds are an outlet for surplus energy (teacher).

These unlawful acts are those which any boy of spirit and energy may do without their having any bad effect on the final formation of his character (teacher).

I look back upon my acts with some surprise that they were not worse (teacher).

They were an outlet for boyish activity, and if another outlet had been found they might not have happened (teacher).

My wonder is that I did not do more. I think they were the natural outburst of boyhood, and did not represent vicious tendencies. If there had not been the restraint and influence of a good home about me, I can easily see that I might have gone much farther (teacher).

Harmless experiences which are often beneficial (student).

Something that every boy of spirit must go through (student).

I think I missed a valuable part of my life in not doing more (student).

As the natural result of undue parental severity (lawyer).

I believe that they were incited by a desire for excitement that was given no satisfaction of a legitimate sort (printer).

They were caused by a love for adventure (student).

Nearly all expressed the opinion that they would have continued to do such unlawful acts had their surroundings and home influences been less favorable.

I am perfectly sure that if it had not been for the kind restraint of my surroundings I should have done much worse things than I did. I was under constant pressure to do the right thing, and I do not see how the majority of boys without such constant help and pressure from some source can fail to go wrong and stay wrong (teacher).

It is certain that environment to a large extent determines the actions of children, and even of adults. The savage does not regard cannibalism as wrong. Had I been brought up under the conditions to which savages are subjected I would probably have been a cannibal also. So, doubtless, with the lawful and unlawful acts of childhood. I acted in accord with my ideas of right and wrong, learned, without doubt, from others about me (teacher).

The following is from a university professor:

If my surroundings and influences had been different I think I might easily have become a criminal. I should have enjoyed

making counterfeit money or planning swindling operations against banks.

It was my surrounding influences and the feeling that if I went too far I should disgrace my family that kept me from becoming a criminal. I enjoyed everything of a criminal nature, but family pride saved me (teacher).

Boy nature is curiously persistent. Pretty nearly everything that our grandfathers tell us seems very unlike what we see to-day, but whenever we get inside information about the escapades of boys of earlier days they have a wondrously familiar sound.

Byron could not work his school exercises, and one of his schoolmates who excelled him in studies could not fight, so they entered into partnership, Byron fighting the battles of his friend in return for help in working his school exercises. "He was pacific and I savage," said Byron, "so I fought for him, thrashed others for him, or thrashed himself to make him thrash others." [1]

Henry Ward Beecher once stole a six-pound cannon-ball from the Boston navy yard. It was a difficult thing to take away undetected, but Henry was equal to the emergency. Wrapping it in his handkerchief he placed it on his head under his cap, and so succeeded in passing the watchful sentinel. The cannon-ball was useless to him, and he gave it away, glad, as he says, to have it out of his sight.[2] Perhaps the suspicious glances that everyone he met seemed to cast at him, and the perspiration which hung in big drops from his face when an officer came toward him as he was passing out, were the best moral teachers he could have had. Even as early as eight years of age, Henry could not resist the longing to pull the rope of the church bell. Church

[1] Roden Noel's *Life of Lord Byron*, p. 41.

[2] *Biography of Henry Ward Beecher*, by William C. Beecher and Samuel Scoville, p. 88.

had already begun, and the old sexton in consternation made some remark about the devil while Henry hurried into church.[1]

Sir Isaac Newton's first real fight seems to have been an epoch-maker in his life. It was the boy just above him in his class who made the trouble, and that is not saying very much for the school ability of either, since, at that time, Newton was the lowest in his form. Newton had always been such a quiet, well-behaved, indolent creature that the other boy thought he would see what he was made of, so he kicked him and found out. After the boy was thoroughly whipped, the schoolmaster's son told Newton that his victory would not be complete unless he rubbed his opponent's nose against the stone wall, and this Newton proceeded to do, dragging him to the wall by the ears.[2]

Sir Walter Scott in his boyhood days was equally ready to tell a story or fight.[3] He himself once said that he was "an incorrigibly idle imp, who was always longing to do something else than what was enjoined."[4]

Wordsworth was a stubborn, wayward, and intractable child.[5] He was the only one of her five children for whose future his mother had any anxiety, and the cause of this, according to Wordsworth,[6] was his stiff, moody, and violent temper. One day while at play, he dared his older brother to strike a whip through a family painting on the wall, and when his brother refused, he promptly did it himself.

James Russell Lowell, so late in adolescence as his

[1] *Ibid.*, p. 61.
[2] Brewster's *Memoirs of Sir Isaac Newton*, Vol. I, p. 8.
[3] *Sir Walter Scott*, by R. Shelton Mackenzie, p. 34.
[4] *Ibid.*, p. 35.
[5] *The Early Life of Wordsworth*, by Émile Legouis, p. 24.
[6] *Autobiographical Memoranda.*

senior year in college, was fined for cutting the seat in which he sat in class-room.[1]

Moncure D. Conway tells, in his autobiography, of a practical joke which he played on Dr. Peck, the president of Dickinson College, in which Conway was a student. "A Methodist conference was to gather at Staunton, Virginia, and President Peck was to read a report on the college. Staunton was famous for its lunatic asylum, whose physician was Dr. Stribling. Under an assumed name," Mr. Conway says, "I wrote to Dr. Stribling that a harmless lunatic had gone off to Staunton, who imagined himself president of Dickinson College, and fancied he had a report to make to the conference. Dr. Peck's appearance was described minutely, and Dr. Stribling was requested to detain him in comfort until his friends could take charge of him. . . . Dr. Peck was met by Dr. Stribling in a carriage, and supposed that such was the arrangement of the conference for his entertainment. Of course the deception was soon discovered at the asylum."[2]

Even St. Augustine, in his childhood, was the same little savage as one to-day expects a normal boy to be, "deceiving my tutors, my masters, my parents, from love of play, eagerness to see vain shows, and restlessness to imitate them," as he pathetically laments in his *Confessions*. "Thefts also I committed from my parents' cellar and table," he sorrowfully continues, "enslaved by greediness, or that I might have to give to boys, who sold me their play, which all the while they liked no less than I."[3] Orchard-robbing, also, may

[1] Horace E. Scudder's *Life of James Russell Lowell*, Vol. I, p. 30.
[2] *Autobiography of Moncure Daniel Conway*, Vol. I, p. 66.
[3] *Confessions*, pp. 17–18.

claim the distinction of antiquity, for Augustine informs us that there was a pear tree near his father's vineyard, laden with very bad tasting fruit. "To shake and rob this, some lewd young fellows of us went, late one night (having, according to our pestilent custom, prolonged our sports in the street till then), and took huge loads, not for our eating, but to fling to the very hogs, having only tasted them. And this, but to do what we liked only because it was misliked."[1]

The age at which boys come to think that laws and the recognized rules of right conduct should be voluntarily respected and obeyed is an interesting question for students of child-life. The great majority of those included in this study say that they did not reach this stage until after they were fifteen years old. About one-half were over sixteen, and not a few were seventeen years of age or older.

Biological studies seem to indicate that man passes through the physical development of the race. The rudimentary organs in man, variously estimated at from 100 to 125 or more, are proof of what the physical life of the race has been. Many of these atavistic characteristics disappear before birth, while others remain as constant reminders of man's humble origin. During about the fifth and sixth months, the human fœtus is covered with "somewhat long dark hair," except on those places which are also bare in quadrumana.[2] The rudimentary hair on man has the characteristic arrangement of the hair on the same part of the body of quadrumanous animals. This is especially noticeable on the upper and lower arm of man where the hair turns

[1] *Ibid.*, p. 23.

[2] Wiedersheim's *Structure of Man*, p. 5, and Romanes' *Darwin and after Darwin*, Vol. I, p. 92.

toward the elbow, "a peculiarity which occurs nowhere else in the animal kingdom, with the exception of the anthropoid apes and a few American monkeys, where it presumably has to do with arboreal habits."[1] The vermiform appendix, which is a functionally active part of the digestive canal of many herbivorous animals, has degenerated in man to a useless and dangerous blind projection of the alimentary canal. The pineal gland, which once caused so much discussion, is now understood to be the surviving rudimentary centre of a formerly functioning central eye.

It is well known that there is not the same advantageous arrangement of organs in man as in quadrupeds. In many details they are evidently better suited to a quadrupedal position than an upright one. We are, therefore, led to assume either that equal skill was not employed in planning man's mechanical organization, or that his change from the quadrupedal to an upright position is comparatively recent, and that there has not been sufficient time for the structural details to adapt themselves to the new conditions.

Recent study in race psychology and child study has led to the belief that there is the same recapitulation in the psychic life as in the physical. The child manifests many tendencies that are characteristic of savages. His fears,[2] tendency to truancy and vagrancy,[3] thieving,[4] love for gaudy colors and ornamentation, anger,[5] and feelings in the presence of nature and water,[6] all point to the same conclusion. The preceding pages have

[1] *Darwin and after Darwin*, Vol. I, p. 89.
[2] G. Stanley Hall: *American Journal of Psychology*, Vol. VIII, p. 157.
[3] Kline: *Ibid.*, Vol. XI, p. 192, and *Pedagogical Seminary*, Vol. V, p. 381.
[4] Dawson: *American Journal of Psychology*, Vol. XI, p. 195.
[5] G. Stanley Hall: *Ibid.*, Vol. X, p. 516.
[6] F. E. Bolton: *Ibid.*, Vol, X, p. 169, and Quantz, *Ibid.*, Vol. IX, p. 449.

given the result of an investigation in certain criminal tendencies of boyhood. It remains to inquire whether they also are not psychical reverberations of long past ages.

The belief that primitive man was an upright and peace-loving creature, who never thought of harming anybody until taught how by those who had outgrown their pristine virtue, has always been a charming thought. This view has, however, been vigorously opposed. "The morality of primitive savages is wholly animal. It is the right of the strongest in all its brutality. The few ethical ideas already gotten or in process of formation are simply the result of unconsciously acquired habits of action. Their actions are not controlled by their reason. The Australian language has no words for justice, error, or crime."[1]

In primitive society the moral law is limited to the relations between members of the same tribe. Any act is lawful and right when a stranger is concerned. He stands outside of the law. This is true not only of men of another race, but also of those of neighboring tribes. Against them any act of violence or treachery is justifiable. In Polynesia hatred for their neighbors was so general that Cook said, "I could have exterminated the entire race had I followed the advice that I received. The inhabitants of all the villages and hamlets begged me to destroy their neighbors."[2] Letourneau observes that it was a recognition of this primitive ferocity that enabled the English missionaries to depopulate Society Islands at a single blow, by pitting one-half the population against the other half.

[1] Letourneau's *L'Evolution de la Morale*, Paris, p. 186.
[2] *Ibid., pp.* 162–163.

Tylor quotes[1] from Schomburgk and Kops, the first of whom has drawn pleasant pictures of the delightful home life, honesty, and truthfulness of the Caribs, and the other of the Papuans of Dory, "where they have not been corrupted by the vices of the white men." But Tylor adds that "those who have fought with them call them monsters of ferocity and treachery. . . . Cruelty and cunning in war seem to them right and praiseworthy."

"Among the Ahts of British Columbia, Sproat remarks that an article placed in an Indian's charge on his good faith is perfectly safe, yet thieving is a common vice where the property of other tribes or of white men is concerned."[2]

"Although the Africans within their own tribe-limits have strict rules of property, travellers describe how a Zulu war party, who have stealthily crept upon a distant village and massacred men, women, and children, will leave behind them the ransacked kraal flaring on the horizon and return with exulting hearts and loads of plunder."

Morality has been a growth. Acts which in one age were thought to have their roots in the very foundation soil of virtue, are stamped by following ages as grossly immoral. The beginnings of morality are to be found in the instinctive feeling for self-preservation. But strict individualism was too severe a strain, and the gregarious instinct, common to animals and man, led to association for mutual aid and protection. These protective groups were at first small, but they grew as need for more organized assistance increased.

[1] *Anthropology*, pp. 406–407.
[2] *Ibid.*, p. 413.

In the conflict between these social groups, Gumplowicz maintains, is to be found the necessary condition of social organization. "The hostile contact of different social elements of unlike strength is the first condition for the creation of rights; the conditions established by force and accepted in weakness, if continued, become rightful."[1]

Cannibalism was a common custom among primitive people, and its morality was beyond question. Man was looked upon by others as merely an animal. They not only killed and ate their enemies, but often women and infants. Later cannibalism was restricted to enemies, except in case of famine. Oldfield says that the aborigines of Australia regarded human flesh as a great delicacy, especially that of girls and young women. As for the men they were beasts of burden to be wounded or killed without hesitation. It was a common practice among the Australians to eat infants. The mother might relieve her grief by sobs, if they were not too loud. She was somewhat appeased, however, on receiving her legal share, the child's head, and devoured it with evident feelings of sweet pain. The Guarayos of South America pursued men much as they hunted wild beasts. They took them alive if possible that they might fatten them and keep them as reserve food.[2]

Cannibalism has been by no means limited to enemies captured in war. In New Zealand slaves were eaten, especially boys and girls, who were cared for and fattened for that purpose.[3] Ordinarily these human banquets were reserved for festal days as a mark of honor for guests. At other times they ate slaves to

[1] Gumplowicz: *Outlines of Sociology*, p. 121.
[2] Letourneau's *L'Evolution de la Morale*, pp. 81-88.
[3] *Ibid.*, p. 92.

punish them for theft or some other offence. Cannibalism to them was perfectly natural and right. "Pourquoi ne pas manger des hommes? disaient-ils à Marsden. Les grands poissons mangent les petits, quelquefois ceux de leur propre espèce. A leur tour, les petits poissons mangent des animalcules."

Morality seems always to be a matter of conditions. That which circumstances so strongly force upon a people that resistance to it endangers existence is felt to be the right thing to do. Cannibalism was especially prevalent among those who lived where food was scarce, as on small islands. Among the Polynesians the stages of advance can be clearly traced. At first they ate one another recklessly, as we have found true of the New Zealanders. Afterwards, except in war, only the chiefs had this privilege. Still later the custom was preserved only in religious sacrifices as a symbolic form.

The growth of moral sentiment is further illustrated by those races that forbade women to eat human flesh because it was regarded as such a delicacy that the men wished to reserve the privilege for themselves. An abhorrence of the practice gradually developed among the women of those races, which finally became so strong that they seemed to have been originally endowed with the dislike. When, however, we trace this feeling back to its origin, we find that they were just as fond of this food as were their lords, whenever they were allowed to indulge. The New Zealand women, for example, were as cannibalistic as the men, while among the inhabitants of some other islands of the same race and civilization as the New Zealanders, the women, at first denied the dainty, finally came to look upon it with the keenest

disgust.[1] The growth of the feeling of abhorrence for human flesh among these can be observed until, finally, the custom entirely disappeared or remained in certain symbolic observances.

Primitive man had absolutely no regard for human life. "Il est sûr que, chez les hommes primitifs, le mépris de la vie humaine est sans limites. Au point de vue des sentiments d'altruisme, de solidarité, les races humaines très inférieures sont incomparablement au-dessous des animaux qu'on peut appeler civilisés, des abeilles et des fourmis, par exemple." The primitive aborigines of Australia used human fat for ointment, and were accustomed to bait their fish-hooks with the fat of infants killed for that purpose.[2]

To kill enough enemies to make an honorable appearance before the gods was the earnest desire of many early peoples, and often they were overcome with sorrow at the thought of the comparatively small showing of their victims. The natives of New Caledonia felt that manhood consisted in persistent fighting, and were very bitter against those who, through authority or otherwise, prevented it. "We are no longer men," they said, "because we no longer fight one another."[3] "The young Sioux Indian, likewise, till he had killed his man, was not allowed to stick the feather in his head-dress and have the title of brave or warrior; he could scarcely get a girl to marry him till he won the feather. So the young Dayak of Borneo could not get a wife till he had taken a head, and it was thus with the skull or scalp which the Naga warrior of Asam had to bring home. . . . The trophy need not have been taken

[1] *Ibid.*, pp. 97–98.
[2] *Ibid.*, p. 102.
[3] *Ibid.*, p. 104.

from an enemy, and might have been secured by the blackest treachery, provided, only, that the victim were not of the slayer's own tribe. Yet these Sioux among themselves held manslaughter to be a crime unless in blood revenge; and the Dayaks punished murder."[1]

Altruism arose as a sort of enlarged egoism, when individual selfishness no longer served its egoistic purpose. In many of his horrible customs primitive man occupied a level lower than that of a large number of the higher animals.[2] But even at this low stage of development a certain kind of social solidarity was necessary to prevent the purely selfish desires of each leading to the complete annihilation of the race. Self-preservation, the strongest of all egoistic instincts, required the extension of self to all members of the tribe. Tribal interests thus became self-interest, not because of any moral ideas about the rights of others, but solely because each one's self-interests were better served. This enlargement of self to include the tribe probably occurred very early in the life of primitive man, since before this no one could sleep in peace.

Affection between parents and offspring seems to be of comparatively recent origin. The primitive savage left his children to the fate that chance might bring, without any other training than that of the tribal customs and practices. As soon as the child was old enough to look out for himself, amid the simple conditions of life, the parents took no further interest in him. Women were ill-treated, and love of the child for its mother was, in many races, unknown. In Polynesia the father en-

[1] Tylor's *Anthropology*, p. 412.
[2] Letourneau's *L'Evolution de la Morale*, p. 164.

couraged the child to scorn and abuse its mother, and in Australia brutality toward parents was common.[1]

Referring to the Bedouins as a type of primitive races, Gabriel Charms wrote, "To fall upon caravans of strangers, to drive off flocks, capture goods, kill and massacre the defenders, especially if they are the inhabitants of cities, such are the virtues which they rate highest. All these ignoble heroes of Bedouin legend we would send to the galleys as highway robbers."[2]

"The astonishment which I felt," said Darwin, "as I first saw a troop of Terra-del-Fuegians on a wild and rugged coast, I shall never forget; for the thought flashed through my mind at once: Thus were our forefathers. These men were absolutely naked of clothing, and covered only with paint. Their long hair was twisted together, their mouths bedrivelled from excitement, and their expression wild, amazed, and suspicious. They possessed scarcely any skill at all, and lived like wild beasts on whatever they could catch. They had no government, and no mercy toward those not of their own race."

"L'homme, avant de troquer avec ses semblables, se procura, tout par lui-même, au moyen de la chasse, de la pêche, du vol, etc. En effet, comme l'a remarqué M. Muirhead, *emere* en latin n'avait pas, à l'origine, la valeur *d'acheter avec de l'argent*, mais seulement celle *de prendre, acquérir, recevoir*."[3]

Of the ancient Germans Cæsar said, "Robberies beyond the bounds of each community have no infamy, but are commended as a means of exercising youth and diminishing sloth."[4]

[1] *Ibid.*, pp. 165–166.
[2] Quoted by Gumplowicz in *Outlines of Sociology*, p. 114.
[3] Ferrero: *Les Lois Psychologiques du Symbolisme*, p. 179.
[4] Tylor: *Anthropology*, p. 414.

"Take a primitive savage, a gregarious human being; what are his moral ideas? He is bound to his fellows by the natural feeling of connection. They help him in his need; to hold to them, help them, and stand by them loyally is one of his moral ideas. But strangers from another horde waylay them, try to get their property, invade their hunting-ground, slay them occasionally, and steal them; therefore to kill these strangers and rob them is another of his moral ideas."[1]

The same contradiction between ideas exists in the mind of the child as existed in the race at different periods. There has never been a sudden complete change in the ideas and sentiments of the race. The old persists and overlaps the new. This brings with it contradiction. So we find the ideas and sentiments springing from the belief in the right of property by seizure existing in the minds of men side by side with those new ideas which came with the growing belief that ownership rests solely on purchase or exchange. The illogical is thus as truly a historical force as the logical.[2] This persistence of racial characteristics and their exceedingly slow elimination is an illustration of Ferrero's law of least effort. Immediate organic or psychic change would involve disintegration, an exaggerated fatigue, from which recovery would be difficult or impossible. Change should never be so sudden as to make disintegration overbalance integration.

The ethical life of children resembles that of primitive man in the absence of a clearly defined moral obligation. Both act largely on the impulse of the moment. In neither case is the conscience organized so

[1] Gumplowicz: *Outlines of Sociology*, p. 171.
[2] Ferrero: *Les Lois Psychologiques du Symbolisme*, p. 184.

as to be greatly influenced by the welfare of others to the apparent detriment of self, or by a future advantage gained by present self-denial.

"One often hears the English schoolboy described as a savage, and after sixteen years' experience of the Andamanese, I find that in many ways they closely resemble the average lower-class English country schoolboy."[1] "Primitive peoples under the exact rule of our culture, young country recruits in the barracks, and school children have much in common."[2]

Le Bon has shown how, in a crowd, the older racial tendencies come to the surface and exert the controlling influence over the actions of adults. At such a time criminal acts are frequent "because our savage destructive instincts are the inheritance left dormant in all of us from the primitive ages."[3] "Men, the most unlike in the matter of their intelligence, possess instincts, passions, and feelings that are very similar." Isolated, man "may be a cultivated individual; in a crowd, he is a barbarian—that is, a creature acting by instinct."[4] Under these conditions inhibitions, the result of ages of culture, are temporarily paralyzed, and the man becomes again a child, for it is just in respect of these inhibitions that the moral life of the civilized adult differs from that of children.

The child also has mental states similar to those of the savage "in the phenomena of delusions and illusions, fads and fancies, questionings and dogmatizings, nonsense-talk, language-play, verbigeration, etc."[5]

[1] Portman: *Vide* Chamberlain's, *The Child*, p. 296.
[2] Chamberlain: *The Child*, p. 298.
[3] *The Crowd*, p. 64.
[4] *Ibid.*, p. 36.
[5] Chamberlain: *The Child*, p. 301.

"Savages and children are alike again in their tendency to 'receive all sorts of ideas, of entirely heterogeneous origins, without thinking of making them harmonize one with another in the least.'" "Children," again, "'divert themselves with mere words, rhyming them, singing them, careless of their nonsensicalness. They invent words through very pleasure of verbigerating.'" In like manner, "'races in their childhood, in the new delight of speech neologise without regard to use or necessity, impoverishing their language by making it plethoric of synonyms.'"[1] Letourneau, also, characterizes savages as almost infantile in many ways. "The most redoubtable warriors would frequently burst into tears at the slightest provocation."[2]

Primitive races and children are especially susceptible to suggestion. It is also this readiness for suggestion that exerts the greatest influence on the crowd, causing it to do things which the members as individuals would scorn. Here, again, the higher and later acquired intellectual life with its inhibitions yields to the lower and older racial passions and impulses of primitive man and the cultured person becomes again the savage. This primitive characteristic of openness to suggestion and auto-suggestion, so noticeable in children, by which an idea immediately goes out in action, brings them into close relation to the savage, and accounts for much of their so-called wickedness.

Race instincts are amenable to primitive custom, and not to the laws of civilization. Hence it is that children so often feel independent of law. "It is certain that to many youths the wish to make sport of justice and to

[1] Tanzi: *Vide Ibid.*, p. 302.
[2] *L'Evolution de la Morale*, p. 168.

compel the authorities to busy themselves with them, leads by way of boasting to an irresistible tendency to evil doing."[1] Stealing is one of the most common ways in which race survivals face modern law. Ferriani is of the opinion that at "from eight to fourteen years the child is almost always a thief."[2]

The race tendencies of primitive man cannot properly be classified under morality. They are neither moral nor immoral. They are simply stages in evolution in which man finds himself, and to the conditions of which all his nature strives to conform. Ethics involves a conception of social relations which sees beyond the processes of nature and seeks to control them for moral ends. The imitation of nature's methods by man, before he has come to a realization of social relations, can no more be judged by an ethical standard than can nature herself. In the past many acts which are now classed as criminal were an aid to social evolution. The law of blood vengeance gave a decided tendency toward law and order during a period in which external restraints were few or altogether wanting, and individual responsibility to society was unknown. The law of "an eye for an eye and a tooth for a tooth," as well as war, has served a useful purpose in uniting social groups, and in teaching them the necessity of coöperation.[3] This service, however, cannot rightly be called ethical since it was rendered blindly, without thought of moral ends.

As we pass from primitive people to the beginnings of civilization we find the same disregard of the rights of others. The immediate personal interests of the invading band are paramount, and murder and the most

[1] Maironi, quoted in Chamberlain's *The Child*, p. 368.
[2] Chamberlain's *The Child*, p. 373.
[3] Tylor's *Anthropology*, p. 432.

exquisite torture are legitimate in accomplishing their purpose.

"As the Saxons and Angles plundered and desolated long before they actually settled, so now their northern kinsmen followed the same course. We first find a period in which the object of the invaders seems to be simply plunder. They land, they harry the country, they fight, if need be, to secure their booty; but whether defeated or victorious, they equally return to their ships, and sail away with what they have gathered."[1]

The Danish conquest of England was one long series of invasions, plunderings, and slaughter. Some adventurers, whether king or lesser robber, representing the type of "the fittest" in that period, organized and carried out the marauding expeditions. During the early part of Æthelred's reign their "invasions once more became mere piratical incursions."[2] They marched through the valley of the Thames, "'doing according to their wont and kindling their beacons'—that is, no doubt, wasting and burning the whole country."[3]

In Germany, toward the close of the Middle Ages, robberies were so common and so respectable that a cardinal of the Roman church was able to say that "all Germany is nothing but a robber's den, and among the nobility it is the most respectable calling."[4] From the twelfth or thirteenth centuries till well into the sixteenth, the law of the individual prevailed, and personal contest was the method of judicial settlement.[5] Men fought for whomever paid them, and when this occupa-

[1] Freeman's *The History of the Norman Conquest of England*, Vol. I, p. 29.
[2] *Ibid.*, p. 180.
[3] *Ibid.*, Vol. I, p. 223.
[4] *Geschichte der Deutschen Kultur*, von Dr. Georg Steinhausen, p. 276.
[5] *Ibid.*, p. 276.

tion failed, or the compensation was inadequate, the enterprising ones joined robber bands or individually held up such as came their way.[1]

The Wild Beggars of the sixteenth century, who made the first organized protest—vicious though it was —against the atrocious cruelty of the Duke of Alva, and the Blood Council, and the legalized pirates, the Beggars of the Sea, are some of the forms that these primitive tendencies took in the Low Countries during the period of national construction and reconstruction.

Here also belong the travelling scholars, toward the close of the Middle Ages, "who, as treasure-diggers and exorcists, made successful attacks on the savings of the peasants and on the provisions in their chimneys. 'They desired to become priests,' then they came from Rome with shaven crowns and collected for a surplice; or they were necromancers, then they wore a yellow train to their coats and came from the Frau Venusberg; when they entered a house they exclaimed, 'Here comes a travelling scholar, a master of seven liberal sciences, an exorciser of the devil, and from hailstorms, fire, and monsters'; and thereupon they made 'experiments.' Together with them came disbanded *Landsknechte*, often associated with the dark race of outlaws, who worked with armed hand against the life and property of the inhabitants."

In different ages and under various conditions, these primitive instincts appear in varying guises, but they are always the expression of the same racial impulses.

In 1770, as choice a crowd of commercial robbers as one could wish to meet gathered on the Lena River not

[1] *Ibid.*, p. 428.

[2] Gustav Freytag's *Pictures of German Life in the XVth, XVIth, and XVIIth centuries*, trans. by Mrs. Malcolm, Vol. 2, pp. 223–224.

far from Yakutsk. "Long caravans of pack-horses and mules and tented wagons came rumbling, dust-covered, across the fields, bells a-jingle, driven by Cossacks all the way from Saint Petersburg, six thousand miles." There were drunken brawlers, "lawless as Arabs; and the only law they knew was the law they wielded. . . . Tartar hordes came with horses to sell, freebooters of the boundless desert, banditti in league with the Cossacks to smuggle across the borders of the Chinese. And Chinese smugglers, splendid in silk attire, hobnobbed with exiles, who included every class from courtiers banished for political offenses to criminals with ears cut off and faces slit open."[1]

Nor does it matter whether it be the Polish-Russian exile Count Benyowsky, "who, on capturing the fort at Bolcheresk, imprisoned all the women and children in the chapel, and at the first refusal of the surrounding Cossacks to surrender set fire to each of the four corners of the church,"[2] or Cobham, who, after taking a Spanish ship in the Bay of Biscay, when "all resistance was over and the heat of the battle had cooled . . . ordered his crew to bind the captain and all of the crew and every Spaniard aboard—whether in arms or not—to sew them up in the mainsail and to fling them overboard,"[3] it is still the same primitive instincts of the race ruling the individual.

In England, shortly after the middle of the sixteenth century, this primitive group-individualism adopting, as it always does, the most effective means for getting results that the period offers, took the form of legalized

[1] A. C. Laut's *Vikings of the Pacific*, pp. 107–108.
[2] *Ibid.*, pp. 121–127.
[3] Introduction to Esquemeling's *History of the Buccaneers*, edited by Howard Pyle, p. 20.

piracy. During the early part of Elizabeth's reign the Channel was alive with pirates bearing letters of marque from various princes and Huguenot leaders. A little later the truce with France and the Papal decree giving all of the New World to Spain made the West Indies and the neighboring coast the most profitable field of operations for these enterprising men. "The Puritanism of the sea-dogs went hand-in-hand with their love of adventure. To break through the Catholic monopoly of the New World, to kill Spaniards, to sell negroes, to sack gold-ships, were, in these men's minds, a seemly work for the 'elect of God.'"[1]

Francis Drake, the pirate and brigand, who robbed the treasure-house of New Spain at Nombre de Dios, waylaid and plundered the Spanish mule-trains carrying gold from the Pacific coast, pillaged Valparaiso, and scuttled the dismantled Spanish ships in port, encouraging his crew, when even their savage natures were horrified at his atrocious murders by assuring them that "the worst boy aboard would never nede to goe agayne to sea, but be able to lyve in England like a right good gentleman,"[2] who sacked Callao, capturing and robbing every boat that came his way, until finally the greatest prize of all, the *Glory of the South Sea*, so weighted down with gold and silver that she could hardly sail, fell his prey, was received in England, on his return, by ringing bells, and messengers hurried to London with the news that Drake had returned,[3] and all the people gave themselves up to a week of holidays, while Elizabeth met a request for his surrender "by

[1] Green's *Short History of the English People*, p. 415.
[2] Quoted in A. C. Laut's *Vikings of the Pacific*, from the Hakluyt Society Proceedings.
[3] *Ibid.*, p. 165.

knighting the freebooter, and by wearing in her crown the jewels he had offered her as a present."[1] It is interesting that, in the midst of this wholesale robbing and murdering, Drake's chaplain groaned "in spirit to see the power of Sathan so farre prevail"[2] among the Indians who brought their sick to be healed. But unfortunately for the growth of culture, this good man is not the only one whose thinking has been vitiated by the narrow concepts used in its deductions; nor is the error peculiar to his age.

But Drake was not alone in having his acts of piracy condoned with lavish honors. Such deeds were looked upon as right if they did not create too formidable international complications. The wrong, as with the Spartans, was not in the act, but in being caught.

In 1668, Henry Morgan, under a commission from the Lieutenant-Governor of Jamaica, sacked and ravaged the Cuban coast, and on his return from an unusually successful cruise of devastation, he was honored for his enterprise by an appointment as Commander-in-chief of the British war squadron in Jamaica. His capture of the city of Panama required the formality of action, and he was sent a prisoner to England, only to return a little later, knighted by the king, as Lieutenant-Governor and Commander-in-chief of his Majesty's forces.

The history of the growth of piracy is an interesting chapter in the evolution of criminality. Beginning in the openly patronized sea-robbers of the latter half of the sixteenth century, it developed into the secretly approved buccaneers of the seventeenth, and reached its

[1] Green's *Short History of the English People*, p. 415.
[2] Quoted in A. C. Laut's *Vikings of the Pacific*, p. 164.

logical culmination in the admittedly criminal piracy of the succeeding period. We have here an instance of the persistence of primitive tendencies in new adaptations. Precisely the same racial instincts whose unrestrained gratification was thought worthy of distinguishing honors in the sixteenth century, send men to the gallows in the eighteenth. As the social idea of morality alters, these instincts continue, for a time, to express themselves in the same old way, and those in whom they are irresistible pay the penalty; then new outlets are found through paths less illegal, even though they may be fully as immoral.

A fact by no means unimportant in this connection is the social and intellectual standing of the families of some of the most famous of the pirates. Morgan came of good stock; Bartholomew Roberts began life as an honest sailor and is known to have been, at the start, determinedly opposed to buccaneering; Kidd was the son of a non-conformist minister, and was selected by the British authorities as the right man to crush piracy; while Esquemeling, who was associated with Morgan in his attack on the city of Panama, was so literary as afterward to write a most entertaining and illuminating history of the buccaneers. Nor is there any convincing evidence that these men were degenerate offspring of good families. They seem rather to have been men of unusual enterprise, who adapted themselves pretty successfully to the prevailing morality, or, as in the case of Captain Kidd and his contemporaries, held to the border line by continuing to act on instincts that, in the more enlightened, were gradually becoming rudimentary. Kidd himself seems to have been a brave man of good intentions who responded in a racial way

to the situation that confronted him. Even in his day piracy was not considered wholly bad.

In estimating the significance of actions, the general attitude of society toward them is of fundamental importance, and well into the eighteenth century respectable men of social standing were not averse to profiting from ventures of this sort. When the effects of the famous Bluebeard were examined after his death, incriminating letters[1] were found from the governor of North Carolina, who, in return for his share, had given the pirate the protection of his official influence, and from various prominent New York traders.

Among themselves these pirates seem always to have maintained a strict code of honor. "For in the prizes which they take," according to their associate, Esquemeling, "it is severely prohibited to anyone to take anything to themselves: hence all they take is equally divided, as hath been said before: yea, they take a solemn oath to each other not to conceal the least thing they find among the prizes; and if anyone is found false to the said oath, he is immediately turned out of the society. They are very civil and charitable to each other; so that if anyone wants what another has, with great willingness they give it one to another."[2] Nor are we justified in putting this in quite the same class as the proverbial "honor among thieves," for Captain Charles Johnson says that they had "a very mean opinion of pickpockets and housebreakers."[3]

When one compares the standards which guided the

[1] Esquemeling's *History of the Buccaneers*, edited by Howard Pyle, p. 254.
[2] Howard Pyle's edition of Esquemeling's *History of the Buccaneers*, p. 82.
[3] Howard Pyle's edition of Johnson's *History of Highwaymen and Pirates*, p. 285.

actions of these men, and their ways of meting out justice, with the organizations that boys form at a certain stage in their development, he is struck with the remarkable similarity revealed. One of these rudimentary societies which arose spontaneously and grew naturally, unhampered by rules laid down by adults, has been described[1] by an observer. The school was situated in the centre of a farm of eight hundred acres, over which the boys were allowed to roam at will. Among the walnuts, and birds' eggs, and squirrels, in which the land abounded, "the boys were in the condition of early man before the earth had become so crowded as to require him to toil for bread or to fight for a hunting-ground." But as the school grew, its nuts became too few. Disputes and fights were becoming common, so some of the boys proposed that after a group once reached a tree and climbed it, the nuts that fell should be theirs. "Any nut-hunters coming to a tree after the first party had been there, and wishing to shake it still further, are required by custom to pile up all the nuts that lie under the tree, for until this is done, the unwritten law does not permit their shaking more nuts upon the ground. Anyone who violated this rule and shook the nuts off a tree before piling up those beneath, would be universally regarded as dishonest, and every boy's hand would be against him." Birds' and squirrels' nests were appropriated by tacking pieces of paper containing the finder's name upon the tree. At the close of the season all privileges lapsed, and the following year a redistribution by the same method occurred.

[1] John Johnson, Jr., Rudimentary Society among Boys; *Overland Monthly*, Second Series, Vol. II, 1883, p. 353.

Rabbit trapping came to be quite a problem in this school because the places frequented by them were few and the traps were too close together. "After two years of this unsatisfactory state of affairs, a large boy who had set his traps rather early proceeded to destroy any that were set closer to his than he thought desirable. . . . His example was followed by others, and by common consent a limited distance between traps was agreed upon as proper."

Social solidarity is a growth. In its most primitive form it rests probably on sociality, the gregariousness of lower animals. The number constituting a social group varies at different evolutional levels. Among the lowest savages it may not exceed fifteen, while with those higher in the scale the number increases to one hundred or more, and when we reach the Iroquois Indians seventy thousand people, according to Lewis Morgan, lived together in a kind of social unity. As man evolves, his self-consciousness enlarges. He wants better food and better shelter, and in his growing intercourse with others complications arise, so that very soon the narrow egoism of small groups becomes inadequate to his egoistic ends. This increase in the size of the group would, in turn, lead to the restriction of self. In a large body—several hundred or more—a leader must be obeyed, and in the councils the interests of all play an increasingly important part in determining action. When this union is momentary, to meet a single emergency, defeat follows. Civilization has been a growth from individualism to coöperation, and the end is not yet.

In this respect the development of boys seems to take much the same course as the race has followed.

Gulick[1] found that the games of boys under twelve years of age are individualistic and competitive, while early adolescence, from twelve to seventeen, is distinctly the period of group games. Boys now cooperate in "team" work. Societies of various sorts are formed, and "gangs" begin their operations. Sheldon's studies,[2] also, show that among boys of this age "there is a tendency to form social units characteristic of lower stages of civilization." Boys are now passing from the state of personal individualism into that of the group. Their games and depredations are carried out under organization, though the number that act together need not be large. A "gang," like a "crowd," is not characterized by size, but by its pervading spirit. At this time boys are still so far individualistic as to care little for the rights of those outside of their "crowd," and this hostile attitude toward society is one phase of the "criminal" instincts which appear during this period. The interests of their own set, however, they jealously guard, and it is this extension of their individualism to include their immediate friends that constitutes the group individualism of early adolescence. It coincides quite closely with the racial stage in which primitive man united in smaller or larger groups for mutual solace and protection. They, too, had just emerged from the stage of personal individualism, and in the change their self had become enlarged to include their associates. The enemy of one member of the group is now the enemy of all, and pleasures and pains are shared in common.

It is, of course, easy to draw the analogy so closely as

[1] *Popular Science Monthly*, Vol. LIII, 1898, p. 801
[2] *Pedagogical Seminary*, Vol. IX, p. 431.

to seem to disprove its validity. We must not expect phylogenetic stages to be exactly reproduced in the individual; nor when they occur need they necessarily follow in the same order. There is no doubt that some children skip certain stages and take short cuts. Sometimes this is forced upon them—often to their disadvantage. Most of us are conscious that a part of our early life was cut out, and we are not always benefited by the operation. It would certainly be very strange if ages through which the race has lived could be blotted from its memory and leave no trace behind.

Adults read their ideas of morality into children's acts, and then catalogue them as right or wrong, when in reality they may be neither. With young children this distinction usually resolves itself into what is permitted or forbidden, and the wickedness of disobedience is greatly mitigated if no bad results follow.

The so-called criminal instincts of children are the racial survivals of acts that in past ages fitted their possessors to survive. They were not merely right, but necessary at that time, and they were right because they were necessary, and because they stood for the best of which primitive man could conceive.

This period of savagery, or semi-criminality, is normal for all healthy boys. Those whose surroundings are favorable to a life of crime continue in it, finally to end in the reform school, and still later, probably, in the penitentiary, while those of better surroundings pass through it without permanent moral injury, and perhaps, indeed, with a stronger character and a keener insight into human nature.

Crime is caused mainly by social conditions that are morally and intellectually unhygienic. One cannot

escape this conviction if he is familiar with the changes for the better that occur in slum districts when once the old crime-haunted tenements are replaced by light and airy modern buildings, and the region made as clean and respectable as other residential sections of the city.

The question of interest to society is not, Can children become criminals because of inherited tendencies? but rather, Must these constitutional peculiarities reveal themselves in the life of the individual, however unfavorable to their development the surroundings may be? I examined the record of 106 children, who had been placed in families by the Minnesota State School for Neglected and Dependent Children, in the hope of getting some information on this subject. The history-book of the institution showed that one or both of the parents of all these children were distinctly bad. The least of which any of them had been guilty was habitual drunkenness and desertion of their families. In 39 instances intemperance, insanity, or criminality was found in both parents, and 39 of the mothers were known to be prostitutes. The fathers of 2 had been convicted of murder, and 3 were serving a sentence in the penitentiary. This is certainly a good ancestry to produce criminals, if the effect of heredity is beyond control. The children whose record is given here include all those on the books of the institution who were more than 17 years of age when last investigated by the State agent, and whose parents, one or both, were known to be bad. All but 16 of them were older than 18 years. Fifty-two of these children were classed by the State agent as excellent, 36 as good, and 18 as bad. Those designated as "excellent" were so strong in character

and ability as to attract unusual attention, while by "good" was meant above reproach in character. One of those recorded as bad was a prostitute before entering the school. Of all those of known bad parentage, then, 83.02 per cent. developed into young men and women of good character when placed in better surroundings.

At the Wisconsin State School I studied the records of 91 children. The same rules of procedure were followed as before, except that a few between the ages of 16 and 17 were admitted. Both parents of 19 children were either intemperate or insane, or had committed a crime, and 13 of the mothers were prostitutes. In this school 12 were classed as excellent, 73 as good, and only 6 had turned out badly. One of these 6, it was found, had been placed with a man who was a hard drinker, although this was not known when the boy was given to him. Another, one of the younger girls, was seduced by the man in whose family she was placed. It is quite possible that some may still revert, though inherited characteristics usually appear in full strength by 16 years of age.

When it is remembered that these children remained with their parents long enough to imbibe a good deal of immorality by contact, the significance of these figures greatly increases. Besides, the children are placed under an indenture contract and, except in rare instances, are treated as servants by those who take them. They are usually valued in proportion to the work they can do.

The records of the Elmira Reformatory, under the splendid management of former Superintendent Brockway, indicate the same preponderant influence of en-

vironment, about 85 per cent. of the inmates being made into respectable, self-supporting men.

We seem thus forced to conclude that, barring the degenerates, and they are comparatively few, children should not be classified as good and bad. They have tendencies and instincts, some of racial and others of family inheritance, but their permanent dispositions are yet unformed and will be mainly determined by their environment, which, of course, includes all that enters into their experience and education.

The average age at which 255 boys were taken to the Waukesha (Wisconsin) Reform School was not quite 13.7 years. This is the time when the largest amount of energy is seeking occupation, and when wise guidance is particularly needed. Yet this is exactly what these boys do not get. They are left to the chance of the street. At this period of life the nerve-tissue is in a hyper-irritable state, and, as Clouston[1] finds, certain forms of emotional and irrational wilfulness, immorality, impulsiveness, and adolescent insanity are not uncommon. Escapades at this time do not necessarily point to a criminal nature. The excessive irritability of the nerve centres, to which the frequency of nervous disorders at this period points, and which will be considered in a later chapter, makes them erratically sensitive. At this age children are especially susceptible to suggestion.

The acts for which many of the boys were sent to the reformatory seem to have been a sort of reflex resistance to dull or disagreeable conditions of life, a blind effort to escape from a hateful monotony. The history-book shows that the common offences were disobedience,

[1] *The Neuroses of Development*, p. 12.

running away from home or school, and stealing small articles, such as candy, tobacco, knives, or small amounts of money. The wish to have some fun was the prevailing motive with many. In comparatively few instances did the things that they took have much value, and most of these were articles which boys long for. They were generally bicycles, watches, and guns. Only 6 boys out of 254 stole money in excess of $5.00.

A sudden change comes in the early years of adolescence, and with it new demands. Energy is in excess, and the childish sports which were formerly so absorbing, no longer satisfy. Early education, as already emphasized, should include the meeting and overcoming of inherited nomadic and anti-social impulses.

The successful control of these ancestral tendencies is the most difficult task of child-training. If opportunity is given children to engage in enjoyable sports, exciting enough to satisfy their boundless imagination, and if school work is so planned as to respond to their varying interests, these rudimentary impulses may gradually be eliminated from their life. These reformatory boys had not only been left to the unrestrained influence of these ancestral traits, but, in addition, the surroundings were such as to favor their abnormal development. The entire absence of the moral sense in many hardened criminals, resulting in practical reversion and in the redevelopment of those activities that are ordinarily rudimentary in the human race, is probably due to the environment reviving their latent power of functioning.

Infancy and childhood is a transition period from lesser to greater brain complexity. If conditions are favorable this complexity is in the direction of greater

intellectual and moral perfection. New cell connections are now being made, and the associations thus established determine the character of the man. It is probable that most of these connections are made unconsciously. Daily contact with associated ideas and acts will end in establishing them in the mental background, however unnatural they may be. Natural and reasonable are relative terms. Their interpretation depends on the paths that have been made among the cells during their expansions from infancy through adolescence, when development followed, uncritically, the lines suggested by experience. The complexity that characterizes a developed brain is not a spontaneous growth. Though mental limitations and possibilities lie within the brain itself the direction that these possibilities shall take, resulting finally in pro-social aspirations or in anti-social tendencies, is determined from without. Criminal training may end in as complex cerebral associations as the best education. Enlarged, *sound* mentality is the result of life amid broad and sound social relations. The subjective possibility for character is actualized only under the influence of perfecting social stimuli. Moral obtuseness is not necessarily the result of native incapacity. It is more often caused by constant exercise in perverted perceptions. Under the action of external stimuli modifications are constantly going on in a child's brain. The form that these modifications take depends on the relations found in experience. The child accepts relations as they are offered, and the ideas thus related form his standard for future judgment. The immediate value of an idea depends on responsive associations, and these are determined by the relations prevailing in the mental back-

ground. Hasty action will be common unless there are arresting secondary associations of sufficient strength to hold the mind in balance until their full meaning can assert itself. The greater the number of these secondary associations the more deliberate and reasonable will be the final decision. The relations resulting from constant contact with vicious surroundings account for much of the moral perversion that leads to thoughtless action, and later to crime.

It is doubtful whether in three-fourths of the cases criminal tendencies are anything else than a convenient name with which to cover our social sins and failure in education. If we have good grounds for believing that "the growth of intelligent plasticity, in any given race, is associated with a disintegration of the instinctive plan, congenital adaptation being superseded by an accommodation of a more individualistic type, to meet the needs of a more varied and complex environment,"[1] and if "a suitable training long enough continued can to a certain extent derange the hereditary tendencies which we call instinctive, and create new ones,"[2] heredity loses much of its necessity, and society, with its power to control environment, becomes responsible.

Yielding to suggestion is closely allied to imitation, which is, of course, a fundamental racial instinct. The best and worst part of a child's education comes to him unconsciously. He acts out its suggestions before his judgment is mature enough to be critical. The writer found that only 24 of the Wisconsin Reformatory boys in question had read any books that were not harmful, and many of these were valueless. They were merely

[1] Morgan, *Nature*, February 3, 1898, p. 328.
[2] Charles Letourneau, *Popular Science Monthly*, February, 1898.

not bad; 35 had read none at all; 29 all kinds, and 12 said good books, but were unable to name any. Most of the books belonged to the class of the James Boys, Diamond Dick, and detective stories. We seem not to be going too far if we assent to Ferona's assertion that "three-fourths of those who enter prison have been led to a life of crime from neglect of education." Moral ideas are rare among these reformatory boys, but there is no evidence of a prevailing absence of the moral sense. Few of them gloried in what they had done; 127 said that they would have preferred to spend their evenings in a free clubroom playing games, had there been such a place where they lived; 3 admitted they liked the saloon better, and 13 would rather have remained at home. When asked whether they would like to be such a man as their father, 138 replied yes, while 58 wanted to be better.

The children of wage-earners in towns and cities, the class from which reformatories are constantly replenished, are, to a large extent, deprived of the stimulus of social respectability. Besides, they do not receive the same treatment as those socially higher. It is rare for any one who can win their admiration and arouse them to personal effort for improvement to associate with them, at least in any other than a patronizing way. No one took enough interest in 20 of the reformatory boys who drank to advise them to stop, while only 6 of the remaining 41 reported being urged not to drink by any one outside of their family; 54 had never seen or heard of any one whom they greatly admired. Of those who said that they had, 54 gave some member of their own family, 28 Washington, while 25 were scattered, and 42 were unable to name any one.

Almost all the boys had lived the greater part of the time on the street. They were under the influence of associates older in crime. 124 said they had never felt any desire to do wrong, but were led on by others and wanted some fun. Of the remaining 14 who replied, 11 believed they alone were responsible for what they did, while 3 were not able to give an opinion.

The importance of suggestion in mental and moral development is immense. In these children, environment, by suggesting little good and much evil, is working mental and moral ruin. Children unconsciously grow into the customs, modes of action, and thought of those among whom they live. The survival of the fittest plays its part in determining the nature of each little social group just as truly as in the larger society, and here, as elsewhere, the "fittest" is he who meets the needs that confront him. The boy who lives among those who lie and steal is a little social outcast if he does not do the same. Here the natural race tendencies are reenforced by social necessity. He may survive in the sense of continuing to live, but he will not survive in the sense of being "somebody," if he do not adapt himself to the habits that pass for the "thing to do" among his associates. Fortunately or unfortunately, the native instinct to imitate comes to the boy's aid, and he does these things without once raising the question of right or wrong. So social imitation, strengthened by all the force of race instinct, becomes a powerful factor in the production of juvenile crime.

The effect of social suggestion in reforming boys is shown in the George Junior Republic. "The most hopeful cases are the leaders of the gangs of toughs, the despair of the city police. Their crimes are more often

the natural expression in their environment of the love of adventure and excitement. Given the avenues and ambitions of the Republic, and they become the ablest chiefs of police, lawyers, students, and workers."[1] "In the majority of cases those who now are of the highest character, were the most inveterate convicts during their early citizenship."

This keen sensitiveness to suggestions offered by the environment is even more striking among primitive people, because with them the change is a racial innovation. The Maoris of New Zealand, who at the beginning of the nineteenth century were fierce cannibals, now send representatives to the New Zealand legislature,[2] and Benjamin Kidd says that "though they are slowly disappearing before the race of higher social efficiency with which they have come into contact, they do not appear to show any intellectual incapacity for assimilating European ideas."[3]

The same response to environment is also seen among the Navajoes of New Mexico, where fifteen thousand wealthy and prosperous people live together, "having few quarrels, no murders, and yet no courts of law, and no obvious punishments for breach of law."[4]

Man certainly seems to have latent possibilities which may become manifest under the stimulating influence of suggestive environment, but without it, may, perhaps, forever remain submerged.

In the light of recent studies in suggestion it is impossible to say where the influence of heredity ends and that of social suggestion begins. Much that has been

[1] John R. Commons, *American Journal of Sociology*, Vol. III, p. 439.
[2] Chamberlain: *The Child*, p. 297.
[3] *Social Evolution*, p. 293.
[4] Washington Matthews, *Journal of American Folk-lore*, Vol. XII, p. 3.

ascribed to heredity may be the result of social suggestion acquired through imitation. It is hard to rid ourselves of an idea that has long strongly influenced our thought. We have believed the juvenile criminal different from other boys, and have thought to find the cause of this difference in his ancestry. If his parents or grand-parents showed criminal characteristics the tendency in the children has been thought to be accounted for; but this loses sight of an important fact which has been generally ignored in such discussions, and its recognition largely destroys the value of arguments based upon such investigations. *Criminals constitute an environment of their own, and make that of their children.* There had been an entire absence in the surroundings of the Wisconsin Reformatory boys of everything that could give them ideas of any other kind of life than the one they led, and suggestive imitation, aided by race instincts, would account for their acts unaided by inherited family tendencies. If boys of good ancestry were placed in the early environment of these boys, it would be a miracle if nearly all did not become criminals. Dugdale's investigation of criminals convinced him, also, that "the tendency of heredity is to produce an environment which perpetuates heredity."[1] Again, he says that "in the 'Jukes' it was shown that heredity depends upon the permanence of the environment, and that a change in the environment may produce an entire change in the career, which, in the course of greater or less length of time, according to varying circumstances, will produce an actual change in the character of the individual."[2]

[1] *The Jukes*, p. 66.
[2] *Ibid.*, p. 113.

There can hardly be any doubt that there is a time in the life of every normal boy when primitive impulses, the reverberation of savage life, carry him on, with almost resistless fury, toward a life of crime. When to these native impulses there is joined an environment favorable to crime, there can be little hope for successful resistance.

There are conditions which may cause some to omit this period in their development. Boys put early into positions of responsibility may lose their boyhood and pass from childhood immediately to manhood. Parents sometimes so win the confidence of their children through companionship that nothing is done of which they are ignorant. They are the confidants of their sons, and a manly character is formed without the loss of those advantages that come with boyish sports. These cases are, however, comparatively rare. More commonly those who do not engage in such acts refrain through fear rather than from any high motive. Doing such things does not indicate a depraved nature. It rather shows an independent, active, aggressive character which, rightly developed, leads to manly courage. I do not mean to say that all who engage in semi-criminal acts during boyhood will be valuable men in society. That depends upon the final turn which is given to the independent strength in them which the courage to do these things shows. Mental and moral development is the result of exceedingly complex processes, and we are only beginning to learn some of the most evident elements in it. We know that native tendencies cannot be whipped out of boys, and that these impulses should be turned into other lines of activity which will satisfy the needs of boyish instincts,

without robbing the child of the desire to act and the resulting mental strength and elasticity. The problem is largely an individual one. The personal equation of boys plays too important a part in their development to make set rules possible, but in the great majority of cases the satisfying outlet for these instincts is through some form of interesting physical activity. Sheldon found[1] that out of 623 societies, formed by boys between the ages of ten and seventeen, 86 per cent. involved this activity. Athletic clubs naturally led with 61 per cent., and predatory societies of various sorts followed with 17 per cent., while industrial organizations came third with 8½ per cent. The curve for predatory organizations rises suddenly at ten years of age, and reaches its culmination a little later.

The secret of creating in boys a feeling of social responsibility which shall lead to intelligent discrimination in conduct, is not to be sought in talks on morals, but in the unconscious influence of the ideas and actions with which they are surrounded, and in pure air, simple, wholesome food, and abundant exercise of a sort that appeals to the impulses of their stage of development. Responsibility should be put upon them—there is nothing to which boys so implicitly respond—and when the results thus secured are disappointing, the boys themselves should be taken into consultation regarding the remedy. Partial responsibility, especially if associated with doubt or suspicion, always fails, but ingenuous co-operation wins responsive confidence.

In recent years educational attitude toward misdemeanors of boys has undergone marked change. Our Puritan forefathers settled the question very easily

[1] *American Journal of Psychology*, Vol. IX, 1899, p. 425.

by throwing the whole responsibility upon the devil, but if his satanic majesty originated all of the nine hundred and fourteen faults which Közle has found enumerated by various pedagogues, the ingenuity of the old gentleman is certainly enviable. But now, as though to leave him supreme in making children bad were yielding him too much authority, Dexter comes along and tells us that it is not the devil at all, but the weather.[1] Children become one hundred and four per cent. worse, he says, when the temperature, with humid air, is between eighty and ninety degrees, and three hundred per cent. worse when it is between ninety and one hundred. Fortunately, he does not tell us what would happen should the temperature rise above one hundred degrees.

All the investigations of boys' sports show that the common factor is competition, which varies only in the form which it takes. In early childhood, as Gulick has said,[2] this competition is individualistic, but later it takes the form of groups and gangs which operate against one another or against society. Sheldon[3] also found the same competitive spirit in his study of 2,284 children. Among boys, as we have seen, athletics led, interest in these sports culminating at about thirteen, and after that gradually lessening, while predatory societies, the next in number, reached their highest point a little earlier.

It is evident that sports of the competitive sort are the civilized outlet for juvenile energy. The more primitive the games, the more they appeal to the basal phylogenetic impulses. Camping expeditions, and op-

[1] *Pedagogical Seminary*, Vol. V, p. 522.
[2] *Popular Science Monthly*, Vol. LIII, 1898, p. 793.
[3] *American Journal of Psychology*, Vol. IX, 1897–98, p. 425.

posing forces organized for strategical conflicts, always awaken keen enthusiasm, and it is through such sports that the racial craving of boys for a wild, daring life of adventure is satisfied without personal injury or social loss. But the advantage to the boys is not merely negative. Led by these physical activities into coöperative helpfulness, the indolent, not infrequently, show surprising interest in their school work. Their life is no longer separated into two sections, one for play and the other for so much drudgery as may be forced upon them; but, instead, it is now one continuous round of mutual activity, in which the part that each plays is essential to the whole. The sports demonstrate to the boys, unconsciously it is true, and for that reason more convincingly, that the teacher who participates is one of them; his work is theirs as their play is his.

Reversion is along the line of least resistance. It is easy to fall back into a less intellectual and more instinctive life, to lose criteria of action acquired in recent ages. The stages through which the race has passed are strongly entrenched in the organic and psychic life, and for this reason their elimination is a slow process. "If for any reason, therefore, development is arrested at a point corresponding to one of these lower stages, the qualities characterizing the latter will persist."[1] This is what happened to the boys in the reformatory.

Morality is a habit long before it is a matter of principle. Because of his greater dependence on the goodwill of his associates, the child, even more than the adult, must accommodate himself to his surroundings;

[1] Dawson, *American Journal of Psychology*, Vol. II. p. 189.

he must adapt himself to the social environment in which he lives. He has not the developed will which will enable him to act independently of his surroundings. We act according to the content of consciousness, and that content in children, inhibitions being to a large extent unformed, is mainly made up of objective social relationships present at the time.

It is a fundamental law of mental no less than of physical growth that the new tends to conform to the old. Nervous impulses stimulated by new experiences follow the pathways of those older, more firmly fixed impulses to which the new most readily adapts itself. Now, there are no pathways so deeply impressed in the organism as those of race instincts. It is because of this that semi-criminal acts fill so large a part of boy-life. New experiences follow the old instinctive race paths, and they will continue to do this for the accomplishment of the same race purpose, though the purpose may no longer be serviceable, unless some other interest be found in the realization of which this nerve energy may be absorbed, without being required immediately to leave its old line of discharge. This is not so much a substitution[1] of one process for another, as it is the substitution of a new purpose for the old one in the same process. It is a recognition of the right of race instincts to exist. Instead of antagonizing them, we use them in developing the child. This puts meaning into the expression, so often heard but so little understood, that we should lead children instead of driving them.

It was belief in the values of childhood's trends visioned by a poet's intuition, in advance of knowledge

[1] Baldwin: *Mental Development*, p. 257.

lately gained, that led Wordsworth to plead for a race of boys like those with whom he "herded,"

> A race of real children; not too wise,
> Too learned, or too good; but wanton, fresh,
> And bandied up and down by love and hate;
> Not unresentful where self-justified;
> Fierce, moody, patient, venturous, modest, shy;
> Mad at their sports like withered leaves in winds;
> Though doing wrong and suffering, and full oft
> Bending beneath our life's mysterious weight
> Of pain, and doubt, and fear, yet yielding not
> In happiness to the happiest upon earth.[1]

[1] *The Prelude, Complete Poetical Works*, p. 268.

CHAPTER III

THE SCHOOL AND THE INDIVIDUAL

It was not very long ago, as history measures time, that a Suabian schoolmaster pointed with pride to the results of his fifty-one years of teaching. He had given "911,500 canings, 121,000 floggings, 209,000 custodes, 136,000 tips with the ruler, 10,200 boxes on the ear, and 22,700 tasks by heart." It was also recorded to his credit that "he had made 700 boys stand on peas, 6,000 on a sharp edge of wood, 5,000 wear the fool's cap, and 1,700 hold the rod." [1] Our early schoolmasters were certainly not troubled with philosophic doubts about the action of matter upon mind, whatever ideas they may have had regarding the mind's reaction.

"Students," said Crabbe's schoolmaster,

> like horses on the road,
> Must be well lash'd before they take the load;
> They may be willing for a time to run,
> But you must whip them ere the work be done;
> To tell a boy, that if he will improve,
> His friends will praise him, and his parents love,
> Is doing nothing—he has not a doubt
> But they will love him, nay, applaud without;
> Let no fond sire a boy's ambition trust,
> To make him study, let him see he must.[2]

[1] Barnard's *English Pedagogy, Second Series*, p. 327.
[2] *Ibid.*, p. 328.

But mental ills that had already broken out by no means exhausted the therapeutical efficacy of the rod; its generous application was also regarded as a kind of antidote for threatening physical aspirations. So we find the good Colet, Dean of St. Paul's, ordering a gentle boy of ten to be flogged, not because he deserved it, as he remarked to Erasmus who was present, but because "it was fit to humble him." Erasmus' own teacher was very proud of him, but being a conscientious man he did not wish his affection to deprive the boy of the benefit of the stimulus approved by the best pedagogy, and so he flogged him just to see how he could bear the pain.[1]

To-day we are passing through a transitional period. Flogging's sceptre no longer brings the small boy to his knees in reverence, though there are those who are sure that, so far as being "shaped" is concerned, the boy has been the loser at both "ends," by thus handicapping Destiny. However that may be, school flogging, like many other social customs, has had its day, and passed. Its popularity was due to a mistaken idea of the nature of sin, and to failure to understand the part that racial instincts play in the life of boys. These were pardonable errors one hundred years ago, because the body of knowledge upon which the newer view rests had not yet been gathered and worked out. The favor that whipping finds to-day rests on the tendency to follow lines of least resistance, a psychical no less than a physical principle. It is very easy to force a semblance of obedience and attention to work. That is a mere matter of superior strength, real or imagined. But to create a desire for work—that is quite a different

[1] *Ibid.*, p. 328.

problem. And then the desire to rule, to govern, to sit in judgment over others, is a racial instinct whose birth antedates man. We condemn it only when we are its victims, and deny its right to exist in children under any circumstances, yet delight to exercise authority over them, though our sole justification may be that we have lived longer—and made more mistakes.

In earlier days the strongest boy in the school had to be whipped before he and his friends would consent to be instructed, and I am not sure but they were wiser, in their unconscious way, than the children of light. They recognized force as a constituent element of school *regime*, and accepted the gauntlet of war. Accommodation by their teachers to this unsound principle of compulsion marked their unfitness. By and by a teacher came into the school who started a fire with the whips while the larger boys looked on in amazement, wondering whether the end of the world was at hand, and unwilling to do anything lest their action might precipitate the catastrophe. Boys and girls react in much the same terms as are expressed by one's action toward them.

There is a delightful little book by William Hawley Smith, *The Evolution of Dodd*. If you have chanced to read it you will remember how Miss Stone, the village teacher, ran through all the precepts and maxims that she had committed to memory during her pedagogical training, to see which one would apply to Dodd as he entered the school-room one morning, and walked up to her desk with the dignity that only six-year-olds can assume. He scraped a huge piece of black loam off his left boot with the toe of his right, just by way of va-

riety, and rubbed it into the floor with his heel. You recall the tortured existence of the teachers. One after another came, but not to stay. Dodd was the one case that pedagogical precepts seemed not to have taken into account. One day eighteen-year-old Amy Kelly was engaged. She had not had the experience which is sometimes thought to have such magical effect in telling its possessor what to do, but which, unfortunately, lends itself quite as readily to old-fogyism, even in those whose youth might lead us to look for better things. So perhaps it was well that she was without experience. Many of the desks were smeared with tallow, "patches of grease that told of debating societies, singing schools, and revival meetings of the previous winter. . . . The stove pipe had parted and hung trembling from the ceiling, while the small blackboard in the corner was scrawled all over with rude and indecent figures." This was too much for one without experience, and so she righted the stove pipe, built a cheerful fire, went to a neighbor's for a scrubbing brush, and began to scrub. It was just at this moment that the irrepressible Dodd appeared, looking with astonishment upon this unusual scene. He stood in the doorway, apparently uncertain whether this was a school, but when Miss Kelly started for the pump to get a pail of clean water, it was too much for him, so he seized the pail, and carried it for her, filling it at the pump. "I hardly think you can carry the pail so full; . . . better let me help you," she said, taking hold of one side. "There, so, now we'll carry it together," and, one on either side of the bucket, they went into the house again. But we need not go farther with the story. You know the rest. If any boy tried

after that to make trouble for Miss Kelly, he had to settle after school with Dodd.

Transitional periods at best are very perplexing. No one feels quite sure of his ground, nor does he know just what to do in an emergency. Fortunately, perhaps, the same uncertainty prevails in the minds of those to whom the change has given additional freedom; only in the latter case it takes the form of testing the limits of the newly acquired liberty. Extreme reform always ushers in unwonted power. So the efforts of school boys to find out just what the abolition of corporal punishment means, to trace the boundaries of their new possibilities, to see how far they may go without reaching the jumping-off place, need not surprise us. Naturally these excursions of discovery keep the teacher's mind in a more or less chaotic state. If she could only make use of the time-honored birch rod, she could very soon demonstrate to them the confines of the new freedom. And so we find the teachers in some of the schools in which corporal punishment has been prohibited, petitioning for a return to the good old ways, and one of the Boston papers, in a recent issue, pleads for the reinstatement of "judicious punishment."

Age has so long thought itself identical with wisdom that we cannot, at times, help wondering why its scintillations fail to dazzle the eyes of youth, yet strangely enough the gratitude that some eminent men express in their maturity is not for the instruction that they received in school, but for the freedom from restraint enjoyed. "Of my earliest days at school," says Wordsworth, "I have little to say; but that they were very happy ones, chiefly because I was left at liberty, then

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and in vacations, to read whatever books I liked." [1] In the university he read voraciously, but only such books as he was naturally drawn to. Absolutely no attention was paid to the prescribed course of study.[2] Sir Humphrey Davy, also, wrote to his mother, "I consider it fortunate that I was left much to myself when a child, and put upon no particular plan of study, and that I enjoyed much idleness at Mr. Coryton's school. I perhaps owe to these circumstances the little talents that I have and their peculiar application." [3] "The regular course of studies," wrote Emerson, "the years of academical and professional education, have not yielded me better facts than some idle books under the bench at the Latin school." [4] "The best teacher of English branches I have ever known," says Andrew D. White, "had no rules and no system; or, rather, his rule was to have no rules, and his system was to have no system." [5] This is not very complimentary, surely, to the elaborate methods of teaching English about which we hear so much to-day. Nor is Edward Everett Hale more comforting. "I have always been glad," he has said, "that I was sent where I was—to a school without any machinery, very much on the go-as-you-please principle, and where there was no strain put upon the pupil." [6] And again he says, "My father was one of the best teachers I ever knew. . . . I owe it to him that for these three or four years, when I really had nothing to do but to grow physically, I was placed with a simple, foolish man for a teacher, and not with

[1] *Autobiographical Memoranda*, Grosart's Edition, Vol. III, p. 220.
[2] Legouis' *Early Life of William Wordsworth*, p. 84.
[3] *Humphrey Davy*, by J. E. Sharpe, p. 13.
[4] *Spiritual Laws, Essays, First Series*, p. 97.
[5] *Autobiography*, Vol. I, p. 8.
[6] *A New England Boyhood*, p. 24.

one of the drivers, who had plans and would want to make much of us." [1] Perhaps his teacher was not so foolish after all. The most successful teachers are those whose method grows out of the nature of the children with whom they are associated, instead of being manufactured in the principal's office, and handed over to the teachers, like any other package of merchandise. Such teachers seem to have no method, so nicely is it adjusted to varying personalities.

When one looks over the boyhood days of men who afterward became eminent, he is impressed with the number who, according to all the principles of pedagogical Nestors, ought to have been intellectually ruined, for they have left undone those things which they ought to have done, and have done those things which they ought not to have done; and there was remarkable health in them. James Russell Lowell has told us, in one of his letters,[2] that he chose what reading he pleased and what friends he pleased, sometimes scholars and sometimes not. Lowell's seeming idleness greatly pained his relatives. His one fault, they said, was indolence and negligence.[3] The *naïveté* of Henry Ward Beecher's teacher, Mr. Langdon, is seen in a letter written to Henry's parents at about the time when, according to Mrs. Stowe, her brother's studies were mostly in the forest with gun on his shoulder. "Whence returning unprepared for school, he would be driven to the expedient of writing out his Latin verb and surreptitiously reading it out of the crown of his hat." "Henry's observance of my regulations relating to study has become exact and punctual," wrote Mr.

[1] *A New England Boyhood*, p. 27.
[2] Scudder's *Life of Lowell*, Vol. I, p. 53.
[3] *Ibid.*, Vol. I, p. 52.

Langdon. "His diligence all along has gradually increased, and I think he has arrived at that full purpose which will insure his making a scholar. My method of instruction for beginners is a system of extended, minute, and reiterated drilling, and the make of his mind is such as fits him to receive benefit from the operation." [1] So well fitted for this kind of work was his mind that after a year "it began to be perceived by the elders of the family that as to the outward and visible signs of learning he was making no progress." [2]

In speaking of Shelley, Dowden thinks that "perhaps his most important studies at Eton were those of his own choice, and not of compulsion." [3] "Napoleon studied diligently those branches he liked, the others he neglected." [4] Scott's reading, in his boyhood, was wholly undirected and unregulated,[5] and, later, in the university, when he was supposed to be absorbing legal opinions, he gave much time to books of "a most miscellaneous kind, reading them in his own way, which often consisted in beginning at the middle or end of a volume," [6] and skimming it with a "hop-step-and-jump." Tested by the standards of school and college, Robert Browning had little education. His knowledge was of the sort not purchasable at universities. "In the atmosphere in which he lived, learning was a pleasure, and a natural pleasure, like sport or wine." [7] At Cambridge, Coleridge was interested in almost everything except his studies, to which he gave at best

[1] *Biography of Henry Ward Beecher*, by Wm. C. Beecher and Samuel Scoville, p. 74.
[2] *Ibid.*
[3] Quoted in William Sharp's *Life of Percy Bysshe Shelley*, p. 35.
[4] Thomas E. Watson's *Napoleon*, p. 26.
[5] Charles D. Yonge's *Life of Sir Walter Scott*, p. 32.
[6] *Ibid.*, p. 14.
[7] G. K. Chesterton's *Robert Browning*, p. 13.

only desultory and intermittent attention; but it was in his room that those gathered who were alive to the questions of the day, or interested in poetry, philosophy, or religion.[1]

To be guided in elementary education by the promptings of the very natures that are to be trained, sounds quite illogical to the adult mind accustomed to look with complacent adulation upon its own deliverances. We are still greatly, even if unconsciously, influenced by the old idea that the nature of children is intrinsically bad. They must be made over, remodeled on a better pattern—the adult pattern—with large parts of them left out. And so we set up a psychical operating-table in every schoolroom, and proceed to cut each child according to our measure, forgetful of our own deficiencies, lopping off one individual trait after another, until we have made him commonplace enough to fit into the traditional pedagogical mould.

Where had we been, we two, beloved Friend!

Wordsworth exclaims to Coleridge—

If in the season of unperilous choice,
In lieu of wandering, as we did, through vales
Rich with indigenous produce, open ground
Of Fancy, happy pastures ranged at will,
We had been followed, hourly watched, and noosed,
Each in his several melancholy walk
Stringed like a poor man's heifer at its feed,
Led through the lanes in forlorn servitude;
Or rather like a stallèd ox debarred
From touch of growing grass, that may not taste
A flower till it have yielded up its sweets
A prelibation to the mower's scythe.[2]

[1] Hall Caine's *Life of Samuel Taylor Coleridge*, p. 28.
[2] *The Prelude, Complete Poetical Works* (Grosart's Edition), p. 266.

Variability is a fundamental biological principle. Without it there is no selection, for the simple reason that there is nothing from which to select. Conformity to a mean reduces all to common mediocrity. Improvement posits variation and this is just the quality that finds least favor in our schools to-day. Individuality may not receive quite the same treatment that it did from Dr. Parr of the Norwich school, who, when informed by one of his teachers that a certain pupil seemed to be showing signs of genius, exclaimed, "Say you so? Then begin to flog him to-morrow morning";[1] but it causes hardly less commotion in the orthodox pedagogical breast. Non-conformists are always hard to dispose of. In school they are particularly objectionable because they do not easily fit into a system. We arrange pupils under a few general types, and those who do not conform to our classification we call lazy, or dull, or bad; but these are only names to indicate certain deviations from the convenient standard of the school, and have no necessary validity beyond its walls. How fortunate this is becomes evident when we recall that Koezle counted more than nine hundred faults of children enumerated by various school-teachers. Judged by the quantity of output the school classification is certainly marvellous, but one cannot help wondering if the sensitiveness that enables the system to register misdemeanors with such remarkable accuracy is not, after all, the chief reason why so few children fit into it without squirming. It gives a very comfortable feeling to assert the supreme beneficence of the system, and to feel compassion for the boys who were not made right; but this complacency is often badly jarred by the incon-

[1] Barnard's *English Pedagogy*, p. 330.

siderate way in which some have treated the school rule for determining mental efficiency, for, according to the rule, so many eminent men should have turned out worthless dolts. John Ruskin, who engaged in original composition from seven years of age, and who at ten presented his father with an original play of no little merit, at sixteen was characterized by his teachers as "shaky" in scholarship, and a little later entered Oxford as a "gentleman-commoner," because it was regarded as doubtful whether he could pass the examinations.[1]

It was not until he was sent to Patrick Hughes' school that Oliver Goldsmith,[2] a stupid blockhead in another school, found a teacher who could discern beneath the external crust of stupidity the dormant power of intellect.

At Harrow, Byron, the butt of the class at another school, because he could not learn the lessons put alike before all, regardless of individual tendencies, first found a teacher who understood him. "He has talents, my lord," [3] he remarked to Byron's guardian. "Indeed!" was the reply in a tone of doubtful surprise. "I soon found," said this same teacher, Dr. Drury, "that a wild mountain colt had been committed to my care. But there was mind in his eye. His manner and temper soon convinced me that he might be led by a silken string to a point, rather than by a cable,—on that principle I acted." [4]

Not one of John Hunter's teachers detected his absorbing interest in nature's world. They merely called him lazy.

[1] Frederic Harrison's *John Ruskin*, p. 16.
[2] Austin Dobson's *Life of Oliver Goldsmith*, p. 17.
[3] Roden Noel's *Life of Byron*, pp. 38–39.
[4] *Ibid.*, p. 40.

To find out how students to-day feel regarding the school's attitude toward them, a few questions were asked of the older students in five normal schools, each in a different State. One hundred and seventy out of 453 said that their teachers did not help them find out their strong and weak points, and only 115 said unreservedly that they did. Of the rest some thought that one or two teachers aided them. In many cases this seems to have been in the subjects that the teachers themselves especially liked. Ninety-five said that their teachers tried to find out what their ideals were, and appealed to them, while 239 replied that no interest was taken in them individually. The others, again, said that in a few instances the teacher's personal influence was felt.

In a large proportion of cases the school seems to have exerted little or no influence except through the medium of the recitation. While there are, unquestionably, many exceptions, teachers are prone to stand apart from their pupils, conducting the recitation well, perhaps, but as something wholly external to themselves and their students. Throughout there is lack of the personal element. Most of those who thought that they had been helped outside of their classes, felt that the chief benefit after all came from their schoolmates. The pedagogue is too much inclined to assume an attitude of superior indifference to life. Latin, mathematics, grammar, and geography, he seems to think, ought to develop children's ability and so fit them to meet life's problems. If they do not, why, then there is something the matter with the boy.

It is curious that everything which enters the schoolroom at once becomes rigid. The method of the recita-

tion has been elevated into a fetich before whose image individuality yields to unbecoming humility. The belief that there is one road to knowledge is fundamentally wrong. There are as many ways of getting ideas as there are individuals. No one has a monopoly on the manner in which children arrive at the number concept, though some have tried to patent the process. Mental flexibility is essential to intellectual growth, and ability to adapt oneself to the innumerable ways in which mind matures marks the born teacher. Possession of this power explains the success of some with little education, and its absence makes useless in the class-room the profound knowledge of the specialist. It was Turgot, I think, who once said that "the first thing for a philosopher to do is to get a system of philosophy, and the second thing for him to do is to discard it." This is eminently true of method. Methods serve him only who has risen above them. To be bound to one is intellectual slavery. One cannot work continuously in the same grooves without becoming fossilized. The mere breaking away from habit rejuvenates the mind. Uniformity, in teachers and pupils alike, arrests mental processes and tends to dullness. Change, variation, is the very condition of consciousness.

Freedom from routine and formality seems to have characterized the teachers who impressed themselves upon those whose subsequent eminence has enabled us to learn of their boyhood days. Dr. Hutcheson, to whom Adam Smith felt so deeply indebted, was a decided radical.[1] It was he who first broke away, at Glasgow, from the almost sacred tradition of lecturing

[1] Francis W. Hirst's *Adam Smith*, p. 5.

in Latin. He worked with his students, ridding them of antiquated beliefs by first liberating his own mind, and he continually stimulated them to do something a little better than they had thus far done, by suggesting possible lines of study and thought.

He is a fortunate man who, from the kindergarten through the university, has had more than one or two real teachers. Abundant knowledge and good character, together with logical clearness in exposition, are commonly thought sufficient; yet the failure of teachers possessed of all these qualities to attract and inspire the boys and girls who later became eminent men and women is a fact the significance of which cannot be ignored. The right of children to their own individual natures is grudgingly accorded the same approval that Edward Everett Hale, when a boy, gave to the schools. He looked upon the whole arrangement as "one of those necessary nuisances which society imposes on the individual, and which the individual would be foolish if he quarreled with, when he did not have it in his power to abolish it." [1]

The dominant sin of the schoolmaster is the attempt to make children homogeneous. Nature does not do things in that way; she makes each thing different from everything else, as though to try her power, revelling in the fruit of her creation. The teacher's work is to take Nature's product, and help her complete it, instead of lamenting her want of wisdom, for subsequent events often prove that she clearly divined the future. The educator's contribution is to bring Nature's design to the highest attainable perfection, so that the final product may serve the purpose for which its

[1] *A New England Boyhood*, p. 24.

own peculiar characteristics best fitted it. The question whether it was inevitable that boys whose ability was demonstrated by their subsequent achievements should dislike their school work is a very pertinent one. Fulton, Newton, William H. Seward, Richard Sheridan, Heine, Joseph Banks, Sir Walter Scott, John Hunter, Lyell, Pasteur, Shelley, Herbert Spencer, Patrick Henry, Emerson, and Thackeray are a formidable group. Was Henry Ward Beecher's prospect of intellectual salvation improved by conditions that led him, in after-life, to say that he did not have a single pleasant recollection of his school-days? His teachers seem not to have given him even the negative cause for gratitude for which Wordsworth and Sir Humphrey Davy gave thanks—that they left them alone. It is a suggestive commentary upon teaching that schoolboys many times recognize ability in an associate where the teacher has missed it. Native tendencies have never counted for much in the schools. Principals and superintendents can make better ones to order in the office.

To meet the needs of children a teacher must be able to read the impulses of their minds. Herbert Spencer's dislike for school was largely due to his aversion to rote learning and his hatred of the dogmatic form of presentation. "The mere authoritative statement," he says, "that so-and-so is so-and-so, made without evidence or intelligible reason, seems to have been from the outset constitutionally repugnant to me." [1] So deeply rooted was this feeling that he was unwilling to study the rules of Latin grammar.

I am aware of the inestimable training thought to be gained from doing unpleasant things—at least when

[1] *Autobiography*, Vol. I, p. 95.

others do them—but the argument has been a little overworked. With given content of subject matter, intensity of effort counts most for intellectual development, and it will hardly be denied that this is greatest when pleasure in the work is keenest. Friction always loses energy. To say that the mind gains more strength from disagreeable occupations than from pleasant ones is a little like the contention of surgeons of earlier days that anæsthetics should not be used because the shock of the operation was beneficial to the patient. Whatever benefit there may be in doing unpleasant things is moral rather than intellectual, and surely there are occasions enough when children must be required to do things that they do not enjoy without trying to find extra ones. It may even be questioned whether the disagreeable element adds to its moral value. Does the boy who is dragged to the field and guarded while he hoes the weeds, and waters the corn with his tears, acquire better habits of industry than the one who, vying with his father to see who can cover the most ground, forgets the ball game that he left? Dr. Adams, the first teacher who understood Scott, used to invite his scholars to attempt poetical versions of passages from Horace and Virgil, but never made them tasks. And, strangely enough, he obtained results.

After all, the best part of our education is gained in seemingly incidental ways. The human mind rather resents the instructing attitude and, though children adapt themselves more easily than adults, still, even with them, the suggestive method is more effective. Edward Everett Hale, speaking of his boyhood days, said: "At the moment I had no idea that any science was being expended on our training. I supposed that

I was left to the great American proverb—'Go as you please.' But I have seen since that the hands were strong which directed this gay team of youngsters, though there was no stimulus we knew of, and though the touch was velvet. An illustration of this was in that wisdom of my father in sending me for four years to school to a simpleton."[1] Much of the intellectual stimulus that inspired Alexander von Humboldt seems also to have been acquired in casual conversations, and in listening to lectures that partook more of the nature of interesting talks than of the formality of instruction. The morning hours given to walks in the garden with Moses Mendelssohn, the friendly intercourse with David Friedländer and Engel, and the informal lectures on physics and philosophy given in his mother's house by the Jewish physician, Marcus Herz, which led later to intimate friendship and association, indicate the method.

So potent is suggestion with children that the mind cannot resist its touch unless aroused in opposition.

> Such was the tenor of the second act
> In this new life,

says Wordsworth, speaking of his seemingly idle college days at Cambridge, amid the haunts of earlier men of fame,

> Imagination slept,
> And yet not utterly. I could not print
> Ground where the grass had yielded to the steps
> Of generations of illustrious men,
> Unmoved. I could not always lightly pass
> Through the same gateways, sleep where they had slept,
> Wake where they had waked, range that enclosure old,
> That garden of great intellects, undisturbed.[2]

[1] *A New England Boyhood*, p. 61.
[2] *The Prelude, Complete Poetical Works*, p. 252.

Wordsworth was a victim of the coercion-drudgery theory, the sanctuary of educators who cannot inspire. Anyone can drive, but few are capable of leading. The time to give information is when it is asked for. That is the psychological moment, and the teacher who cannot create the desire for knowledge should speculate in other futures than those of human beings. The school may not be able to make poets or scientists or philosophers, but it can certainly spoil them.

It is a very trite remark that if education is to be effective the child must react upon it, but in this statement there is always an implicit assumption that reaction is of one sort. Education suffers from the disease with which thinking is commonly afflicted, only it has it in a little worse form. We incline to think in formulæ, and having once found the magic words, our pedagogical soul feels the peace "which passeth all understanding." What a curious position "interest" holds to-day in pedagogy!—a kind of artificial attachment to a disagreeable piece of work by which it is thought to beguile unsuspecting urchins into the belief that it is fun! But, after all, what a difference there is between the real thing as you find it among the boys themselves and the pedagogically made article, so mechanical that the children can see the wheels go round. What makes the difference? Is it in the nature of the activity? Are some things intrinsically interesting and others tedious, and is that all there is to be said about it? It would be pleasant to answer this question in the affirmative, since we should then be relieved of a heavy responsibility, and our past failures would be condoned; but, unfortunately, the facts are against us. Just those things that are drudgery in the school-room

become play on Saturday. Take the most fascinating sport in which boys indulge, cave-digging; how long do you think their enjoyment of it would last if it were introduced into the school curriculum? You would soon experience the absurdity of listening to wearisome platitudes from method-loving pedagogues on the art of awakening interest in the construction of caves. It would all be reduced to rules—the method of the recitation—with prolegomena on the preparation of the children for their lesson, and an extended argument to prove that it must not be expected that boys will find pleasure in the work, but some painful drudgery is necessary by way of preparation for the agonies of life.

Now this does not mean that school work should be made easy. Pleasant and easy are by no means synonymous. The houses that children build, the caves that they dig, the mysterious and secret alphabets that they invent, and by means of which they carry on correspondence with one another about war measures against the enemy, are not easy, but they are pleasant. The writer once knew a group of half a dozen boys who invented an alphabet the intricacies of which would have brought the blush of shame to the cheeks of the Phœnicians who devised our own, were difficulty in acquisition the issue; and yet they spent their Saturdays editing a paper printed in those marvellous hieroglyphics. Suppose this alphabet had been introduced into the school, and the boys had been reproved or kept after school for not mastering it. Much of the work that children call play is just as hard as any that is given them in the school-room. The attitude of the teacher makes the difference. Primitive man did not distinguish between work and play, and children do

not until the distinction is forced upon them. Orthodox pedagogy, under the spell of the mysterious efficacy of severe mental strain, wants to make everything conscious, unmindful of the fact that many times the learning processes are most effective when there is no conscious effort. Every little while children must be mentally eviscerated, in order that the degree of mental digestion may be observed and a percentage value given. This is thought to hold the pupils to a higher standard of work; but, on the other hand, the human mind, fortunately, perhaps, adapts itself with remarkable facility to continued misfortune, and settles down into indifferent acquiescence.

The assertion that the cases which have been cited are exceptional, and for that reason without evidential value, is not sufficient; for, first, it is clear that the teachers did not recognize them as exceptional; *i. e.*, did not understand them, but, instead, regarded these boys as commonplace; second, the claim that they are exceptional is an admission of the unrecognized right of individual differences to a fundamental place in education, and this is the position of the writer.

Forced attention accomplishes little. Intellectual effort is most effective when it springs from an irresistible impulse in the individual to do the thing, and that impulse can never be stirred by external constraint or restraint. The effective line of approach to children is through their racial instincts and individual dispositions. These are their vulnerable points, easily taken without loss to either side, and, when once communication is opened, it is astounding how many native tendencies may be made allies in promoting intellectual and moral growth. It is against those who are in-

different to these instinctive tendencies of childhood and youth that Wordsworth hurls his scorn—

> Those mighty workmen of our later age,
> Who, with a broad highway, have overbridged
> The froward chaos of futurity,
> Tamed to their bidding; they who have the skill
> To manage books, and things, and make them act
> On infant minds as surely as the sun
> Deals with a flower; the keepers of our time,
> The guides and wardens of our faculties,
> Sages who in their prescience would control
> All accidents, and to the very road
> Which they have fashioned would confine us down,
> Like engines; when will their presumption learn,
> That in the unreasoning progress of the world
> A wiser spirit is at work for us,
> A better eye than theirs, most prodigal
> Of blessings, and most studious of our good,
> Even in what seems our most unfruitful hours.[1]

[1] Wordsworth's *Complete Poetical Works, The Prelude*, p. 267.

CHAPTER IV

REFLEX NEUROSES AND THEIR RELATION TO DEVELOPMENT

We have seen how little attention has been given to the individuality of children and youths under organized systems of education. The preceding chapters have dealt with racial and mental tendencies. There are, however, conditions under which the natural mental trend may be disturbed or perverted by nervous irritants, and of these education should also take account.

A few year's ago the writer's attention was called to a girl of about fifteen years, who, when reading, inserted words which were not in the text and omitted others that were there. On being questioned, she said that she was not aware that she made such mistakes, yet, on re-reading the passage, words were again inserted, though not always the same.

A belief that the difficulty was physical rather than mental, led to an examination by an oculist. It was then found that the external muscle of the left eye was so much stronger than the internal, that, as soon as she fixed both eyes on a word, this eye was pulled out of range, though she was not aware of it. Through long experience with this defect the girl had unconsciously acquired the habit of ignoring the object seen

with the left eye, but at times she would confuse the two objects and give her attention to this one instead of the other. Such was the case when, in reading, she inserted words that were not in the passage. She saw them with her left eye on another part of the page. This girl was already a neurasthenic, and the derangement of her nerve centres was, without doubt, largely due to the strain resulting from this muscular defect. Previous to this, her teachers had thought her hesitating manner and mistakes due to mental incapacity.

The school age is the nascent period of the nervous system. Most of its paths have already been formed, others probably have not yet become functionally active, but none of them are definitely fixed. Even in those structures whose organization is complete, the nervous elements have not yet grown accustomed to facile response. Many have not yet acquired the habit of functioning economically toward a definite end. Energy is needed for the completion of cerebral organization, and any waste of nervous force may seriously interfere with structural growth and the establishment of normal function. Exactly this happens when organs, because of structural defect or disease, fail to contribute their share toward the conservation of the nutritive tone of the nervous system, the maintenance of which is aided in no slight measure by organic and peripheral impulses that are too weak to rise above the level of consciousness. A diseased organ can send out only diseased impulses, which are a continual source of irritation to nerve centres, and which, if allowed to continue, finally bring about such a derangement of function as to give the appearance of real nervous or organic affection. Yet careful observation will often

show that the cause of the trouble does not lie in the nervous system nor in the organ that seems to be diseased, but in some other organ that conceals its responsibility by reflecting its disorder through sensory and motor nerves.

One of the most frequent sources of these reflex neuroses is the eyes. Through the kindness of some physicians,[1] I am permitted to draw a few illustrations from their practice.

Case 1.—Girl, age sixteen years. Parentage, American; surroundings, good. Exceedingly nervous; terrors by day and night; insomnia and indigestion with palpitation of the heart. Consulted an oculist and the symptoms were relieved by the correction of the ocular error of refraction.

Case 2.—Girl, age eighteen years. Parentage, German; symptoms, intense headaches and vertigo; gaseous indigestion and general nervousness. Examination showed that her eyes were very uneven in visual acuity. With the proper correction the symptoms entirely disappeared.

Frequently eye defect results in loss of ambition, disinclination to study, and apparent dullness.

Case 3.—Girl, age sixteen years. She was behind in her class and complained of headaches and of becoming sleepy while reading. About this time she exhibited an aversion to studying and to practising on the piano. This was inexplicable to her mother, as the girl had always been very studious, and only the year before had won class honors. An acute catarrhal inflammation of the eyes brought her to the oculist, who found that she had hypermetropic astigmatism. The proper correction brought complete relief and all the disturbing symptoms vanished.

That the strain of hypermetropia may produce dullness is well known to teachers who have given the subject any attention. The effect of this nervous tension

[1] The author is indebted to Drs. H. L. Wolfner, F. E. Woodruff, Greenfield Sluder, and Meyer Wiener, of St. Louis, and Dr. D. N. Alcorn of Stevens Point, Wis., for the history of the cases, not otherwise credited, which are reported in this chapter.

is more disastrous because the usually excellent vision of those afflicted renders it so insidious. "Near-sighted children, who are quickly detected by the school test, can often read for hours with the book held at their near points, and frequently are the brightest scholars in the school, while their hypermetropic neighbors of equal mental capacity, who pass the school test by a more or less excessive accommodative effort, finding that they cannot maintain for long the added strain for near work, fall behind in their studies."[1]

Case 4.—Boy, age ten years. This child was quick and bright in many ways, but dull in school. When studying he became sleepy, but was always ready to play. At times he complained of headaches, but as his vision was good, no thought was given to his eyes. Finally, however, largely on account of his excessive nervousness, he was taken to an oculist in order that his eyes might be definitely excluded as a causative factor. Under a mydriatic considerable latent hypermetropia became manifest. When this was corrected his headaches ceased, and his renewed interest in his studies brought great improvement in his class standing.

Case 5.—Boy, age eleven years. Surroundings good, but he was so dull in school that he had fallen three years behind. Examination revealed mixed astigmatism. When this was corrected he began to improve physically, and two years later he had overtaken his former classmates.

Headache is so commonly caused by eyestrain that the more intelligent physicians now make this the starting-point in their diagnosis. In 1899, Dr. Risley went over the records of one thousand consecutive eye patients, and found "that upward of fifty per cent. of them complained of headache, and that many of them had been sent to him by their physicians in the hope that the pain in the head, which had proved rebellious to general treatment, might be due to some

[1] *Boston Medical and Surgical Journal*, Vol. CLII, 1905, pp. 209–210.

ocular defect."[1] One of Dr. Risley's associates found that out of two thousand patients, drawn from private and hospital practice, seventy-three per cent. suffered from headache.[2]

Dr. Barker[3] investigated one hundred of his former migraine patients, and the records showed that fifty-five of these were cured when their error of refraction was corrected. Of the remainder, thirty-one received great benefit, seldom having any attacks, and those which they did have could usually be accounted for by excessive eye work, worry, indiscretion in eating and drinking, or by failure to wear their glasses. Five of the fourteen, who were not benefited by the correction of their error of refraction, were cured by tenotomy of the ocular muscles.

A few cases, culled from the medical journals, will illustrate this type of reflex disorder.

Case 1.[4]—Girl, age twelve years. This girl complained of constant headache accompanied, at times, by nausea and vomiting. She had been obliged to leave school because her headache was always aggravated by study, and for the past year she had been treated, without relief, by a general practitioner. "She was pale, without appetite, very nervous and restless at night, and suffered from palpitation of the heart." Correction of her hypermetropia brought relief from the headache and nausea, and was followed by improvement in her general health.

Case 2.—Girl, age eleven years. For a year the child had been troubled with headache, vertigo and nausea. She had little appetite, was anemic and nervous, but especially restless at night. A short, hacking cough, which was increased by nervous attacks to which she was subject, greatly worried her parents. Two months before consulting Dr. Coover, "she became suddenly un-

[1] *The Eye and Nervous System*, by Posey and Spiller, p. 744.
[2] *Ibid.*
[3] *The Ophthalmic Record*, Vol. XVI, 1907, p. 1.
[4] The following two cases are taken from Dr. D. H. Coover's paper in *The Medical News*, Vol. LXVII, 1895, p. 450.

conscious, her body was convulsed, and she foamed at the mouth. This attack lasted about ten minutes; preceding it she became very nervous and suffered from severe headache. She had, in all, seven attacks. They usually came on in the evening after school." Full correction of her hypermetropia was followed by the disappearance of her headache and cough, and the convulsive attacks ceased.

Case 3.[1]—Girl, age nineteen years. From early childhood she had been afflicted with severe and continuous headache accompanied by gastric trouble and malnutrition. Three months of monocular exercise, with correction of her error of refraction, was followed by complete recovery.

Case 4.[2]—Girl, age ten years. She suffered from indigestion and headache, and was in a state of nervousness bordering on melancholia and hysteria. In addition, she showed symptoms of enuresis, which usually occurred at night. This trouble had existed for two years, and a number of physicians had been consulted, but without relief. Examination of her eyes disclosed ocular defects, which were corrected, and in six months she had entirely recovered.

Case 5.[3]—Girl, age fifteen years. Five weeks before the physician was consulted she had fallen in a convulsion while in school. During the attack she was unconscious and foamed at the mouth. "The aura consisted of pain in the head, dizziness, and blackness of vision, and after this she passed into a general tonic spasm, which lasted for five minutes." These attacks followed continued use of her eyes, and they occurred either in school or shortly after. She was nervous and suffered from almost constant headache. Examination of her eyes showed compound hypermetropic astigmatism. Glasses were prescribed, and so long as she wore them she had no attacks, but on one occasion, when they had been mislaid, she had four convulsive seizures. After they were found and again worn the attacks once more ceased and had not returned up to the time when the case was reported.

Sometimes choreic symptoms accompany the central disturbance produced by the reflex irritation.

[1] Reported by Dr. George M. Gould in the *Journal of the American Medical Association*, Vol. XXXIX, 1902, p. 1110.

[2] Reported by Dr. Percy R. Wood in the *Journal of the American Medical Association*, Vol. LXVIII, 1907, p. 50.

[3] Reported by Dr. D. H. Coover in *The Medical News*, Vol. LXVII, 1905, p. 450.

Case 1.—Boy, age thirteen years. He was constantly blinking, and with this habit was also associated a slight twitching of the facial muscles; the boy was tall for his age, slender, and pale, and his mother said that he had grown very fast. He complained of headaches and at times of pains in his eyes. After he had read for a while the letters blurred and had a tendency to run together. When examined by the oculist he was found to have hypermetropic astigmatism, the correction of which soon brought complete relief, and in a short time his choreic tendencies entirely passed away.

Case 2.—Boy, age ten years. Surroundings good; he was very fond of out-door play, but had not developed physically as he should. His symptoms were nervous muscular twitchings, at times greatly exaggerated. His eyelids were in constant motion, and occasionally he complained of severe headaches. His ocular error of refraction was relieved and his muscular insufficiency treated, and he was kept under observation for eight months, during which gradual improvement was noticed. When last seen, three years after consulting the oculist, all of the choreic symptoms had disappeared.

Dr. O. F. Wadsworth,[1] Dr. William C. Posey,[2] Dr. E. R. Lewis,[3] Dr. Henry W. Kilburn,[4] and Dr. George M. Gould[5] have reported cases of torticollis and spinal curvature which were caused by eye defects.

Some years ago Dr. George T. Stevens published[6] the result of the treatment of thirty-four cases of epilepsy on the supposition that ocular defects were an important factor in producing their epileptic condition. "Of this number," he says, "five were withdrawn from treatment before obtaining any relief from important ocular defects, and should not be included in calculating the results of treatment. The remaining twenty-

[1] *Transactions of the American Ophthalmological Society*, 1889, p. 381.
[2] *Journal of the American Medical Association*, Vol. XXXIX, 1902, p. 1365.
[3] *Ophthalmic Record*, Vol. XII, 1903, p. 22.
[4] *Boston Medical and Surgical Journal*, Vol. CLII, 1905, p. 210.
[5] *American Medicine*, Vol. VII, 1904, pp. 513 and 518.
[6] *Functional Nervous Diseases*, 1887, pp. 104 and 106.

nine cases have been treated only by removal of ocular defects. Of these twenty-nine cases, fourteen may be considered well; two, who are still under observation, are believed to be permanently relieved; three others, still under treatment, have received such marked relief that it is believed that an entire discontinuance of the malady may be expected. One, who had manifested some improvement, died by accident four months after his first visit. Seven others have received temporary relief, while two have manifested no improvement."

While there has been something of a reaction, lately, against Stevens' view of the relation between eye defects and epilepsy, one finds it difficult, after an examination of recent medical literature, to escape the conviction that the central nervous irritation resulting from eyestrain may be so great as to destroy the stability of centres hereditarily weak and produce epileptiform convulsions. Space permits the citation of only a few cases.

Case 1.[1]—Girl, age nine years. From her fourth year the child had had epileptic convulsions. When this record was made they were occurring from three to six times a month. At eight years of age she was sent to school and the convulsions then rapidly grew worse. A year after the correction of her compound myopic astigmatism, her parents reported that the seizures ceased soon after she began to wear the glasses.

Case 2.—Girl, age eight years. The child had manifested epileptic symptoms since she was three years of age. Examination showed compound hypermetropic astigmatism, which was corrected, and when the case was reported, five months after the glasses were prescribed, her parents said that during that time she had been free from attacks.

Case 3.[2]—Girl, age eighteen years. Dr. W. F. Conners, who reported this case, says that the girl consulted him for what she

[1] The two following cases were reported by Dr. C. M. Clapp in the *New York Medical Journal*, Vol. LXX, 1899, p. 412.

[2] *Medical News*, Vol. LXIII, 1893, p. 531.

called nervous spells. Investigation showed that they were epileptiform seizures. In other respects her health was good. Correction of her error of refraction brought complete relief from the attacks.

Case 4.—Dr. S. W. Toms tells of a man, twenty-four years of age, "now confined for epileptic insanity in one of the colonies. He never had had a convulsion until he was ten years of age—the period of life when active school work begins and use of the eyes becomes considerable. There was no family history, even the remotest, of epilepsy. His mother, however, had suffered from headaches. The attacks of the boy continued, despite rigorous medication, as long as he attended school. He was withdrawn from his studies and the convulsions ceased, without medicine, for three years. An attempt to take up art after school work caused a relapse, the convulsions became more severe, and continued application to his art, combined with heroic drugging, brought on insanity."[1]

Dr. Ranney cites[2] numerous cases of epilepsy of which the exciting cause, at least, was the reflex irritation produced by eyestrain. Eighty-seven per cent. of these patients, he says, were either wholly cured or greatly benefited by correction of their ocular defects. Dr. Horatio C. Wood[3] also includes astigmatism and other imperfections of the eyes among the exciting causes of epilepsy.

Another form in which a reflex neurosis, having its primary cause in the eyes, may appear, is seen in a remarkable case reported to the writer by Dr. D. N. Alcorn, of Stevens Point, Wisconsin.

About nine years since, a man visited Dr. Alcorn for examination. In the course of the inquiry the following facts were learned. During the three preceding years the patient had suffered from three attacks of what his

[1] *Medical News*, Vol. LXXVII, 1900, p. 689.
[2] *New York Medical Journal*, Vol. LXV, 1897, pp. 16 and 45.
[3] Pepper's *American Text-Book of the Theory and Practice of Medicine*, 1896, Vol. I, p. 620.

physicians diagnosed as paralysis. For about three months after each attack the man was afflicted with sensory aphasia. He was unable to interpret written or spoken words. He could pronounce words, but they had lost their meaning for him. During the entire three years he had been unable to attend to any business. The visual acuity of his left eye was twenty-twentieths and of the right eye about six two-hundredths. Under a mydriatic the left eye manifested a slight degree of hyperopic astigmatism and the right eye a high degree of mixed astigmatism, corrected with a + 3.00s ⊂ — 7.00 C axis 80°. With this correction the visual acuity of the right eye was twenty-twentieths minus. The final correction made for both eyes was: left eye + 25 C axis 180°, right eye + 3.00s ⊂ —7.00 C axis 80°. The patient returned in three months and said that he had entirely recovered and was attending to his business regularly. A year or two later he was again seen and reported that he had never felt any symptoms of a relapse since he began wearing the glasses nearly nine years before, except on one or two occasions when his glasses had become twisted or when for some reason he had laid them aside.

An editorial writer in a recent number of *American Medicine*,[1] under the title "One Overlooked Factor in the Increase of Insanity," says that "the action of the malformed eye, as has been demonstrated by science, and by thousands of clinical cases, begets diseases of eye, of cerebral action, of feelings, and of nutrition. . . . Suicide, it has been found, is exactly in proportion to the number of hours of school life and study demanded in the country concerned. To this suggestive fact is

[1] Vol. VII, 1904, p. 228.

now added the demonstration that insanity is almost precisely in the same proportion."

Drs. Walton and Chenney cite[1] the case of a woman of thirty-three who was committed to an asylum because of impulses to injure others, especially her child and husband. The history of her derangement "is full of accounts of hysterical attacks (sometimes convulsions), when she would be noisy, scream, attack the nurse, for whom she ordinarily had great regard. She had sinking spells, and was so easily exhausted that most of her time was spent in bed." Finally, she was fitted with glasses which brought so much improvement that she was discharged, and the attending physician agrees with Drs. Walton and Chenney that, but for the glasses, she would have been in the asylum to-day.

I am aware that there is a strong disinclination among alienists to accept the view that definite nervous disorders may be produced by eyestrain. It is to be regretted, however, that they have adopted the legal method of basing their defence on technicalities. Distinctions between predisposing and exciting causes are, of course, essential to the science of disease, but a sick man is less interested in classification than in being cured. Now it is indubitable that, in numerous instances, alienists are wholly unable to give relief until the oculist has done his work. In extreme cases, like epilepsy and insanity, I have no wish to deny predisposition, but if the transition of the predisposition into actual disease is due to the nervous irritation caused by eyestrain, then the latter becomes a true etiological factor. Further, if it can be shown that there are cases in which the disease-stage would not have been reached,

[1] *Boston Medical and Surgical Journal*, Vol. CXXVII, 1892, p. 156.

had not this exciting cause existed, and the cures after correction of the errors of refraction seem to establish this, then the distinction between predisposing and exciting causes loses much of its significance.

The apparently organic diseases which may be of reflex origin caused by uncorrected ocular defects seem to cover very nearly the entire field of pathology. Dr. M. P. Smithwick cites cases[1] from his practice which show that eyestrain may produce gastric intestinal neuroses. He has cured indigestion, after all treatment has failed, by having the error of refraction corrected. Drs. Stockton and Jones call eyestrain "one of the most prolific causes of functional gastric disturbances," and they add, "almost any neuroses may be induced by it. . . . Without attempting to refer the condition to any special form of eyestrain, we have, nevertheless been impressed with the frequency of the association of astigmatism and muscular imbalance, with painful sensory conditions of the stomach, especially taking the form of distress and pain."[2] Hypermetropic astigmatism they regard as "the most common form of eyestrain met with in nervous affections of the stomach,"[3] but "muscular errors are exceedingly aggravating and constitute a fruitful source of reflex gastric disturbance," while compound hypermetropic or mixed astigmatism, with irregular axes, and perhaps anisometropia, is a very common form of brain and nerve-disturbing eyestrain."

Sometimes eyestrain reacts upon the moral nature and, if not relieved, may even result in a permanently perverted disposition. Dr. Peter A. Callan testifies

[1] *The Boston Medical and Surgical Journal*, Vol. CXLIII, 1900, p. 444.
[2] *American System of Practical Medicine*, Vol. III, p. 111.
[3] *Ibid.*, p. 134.

that he has no hesitation in saying "that refraction errors of high degree have great influence on the formation of the character. The young myope seeks companionship in his books—grows introspective—lives in an ideal or unreal world of his own creation; he becomes bashful, diffident, and takes no part in the sports of his companions, so that his physique suffers. The hypermetrope with high degree of error learns but slowly, on account of the great strain to see—books are to him distasteful. He may be classed as a dullard by his parents and teachers, and often censured unjustly, when really he has entered the race heavily handicapped."[1]

Recently the writer's attention was called to a young man who, at ten years of age, suffered from excessive bleeding at the nose. The slightest exertion would bring blood. He was so timid that he would not go to school alone. His nervous system was almost wrecked. Any boy's play in which he was one of the objects of sport would cause him to burst into tears and run into the school-room for protection. After this had continued for a year or two, his mother decided to have his eyes examined. Excessive hypermetropia was at once detected and glasses prescribed. Almost immediately the boy's whole nature changed. The bleeding at the nose ceased, and he began to grow strong. In a short time his timidity disappeared and he became one of the boys, as courageous in play as any of them.

Some forms of eye defect cause children to be misunderstood. Teachers are likely to judge the character of a pupil by his facial expression. Failure to

[1] *The Journal of the American Medical Association.* Vol. XVI. 1891, p. 435.

look them in the eye, when talking to them, gives the impression of insincerity. This often does children injustice, since it is well known that in certain forms of muscular inequality the open and frank expression of the face seems to be wanting, while in other muscular defects there is a markedly blank expression of the face. In both cases it is difficult to look steadily into the eyes of the person to whom one speaks.

The chief obstacle to relieving eyestrain in children is the fact that some of the causes of the most serious reflexes do not interfere with the acuity of vision. Dr. Callan refers to one of his patients who had long suffered with migraine. "When I first suggested to her that her eyes were at fault," he says, "she remarked that it was impossible, for her vision was excellent, and none of the many physicians whom she had consulted, both at home and abroad, ever even mentioned such a thing."[1] Dr. Toms also says that he is often confronted in his practice with the statement, "I am sure, Doctor, that my headaches do not come from my eyes, as I can read the names of the steamboats on the river."[2] "It is these far-sighted (hypermetropic) eyes," he continues, "that so frequently have their concomitant symptoms; and, moreover, a considerable portion of those having a muscular anomaly are perfectly emmetropic, or have normal vision. The efforts that the brain centres make in the acts of accommodation and adjustment in producing perfect pictures on the retina, and in binocular single vision, more especially in near work, produce eyestrain, and reflex symptoms develop."

[1] *The Journal of the American Medical Association*, Vol. XVI, 1891, p. 437.
[2] *The Medical News*, Vol. LXXVII, 1900, p. 89.

Myopia is practically the only eye-defect that receives any attention in our schools and, so far as nervous strain is concerned, it is also the least important, because it cannot be counteracted by effort. Hypermetropia, muscle insufficiency, and the various forms of astigmatism, on the other hand, are far more serious. Hypermetropic eyes are never at rest. From morning until night the strain continues, and in many instances a fixed innervation of the ciliary muscle prevents relief even during sleep. Contrary to the popular idea, also, it is the lesser optical defects that are accompanied by the greatest strain, because in these cases the effort of the ciliary muscles to correct the error and secure perfect vision is unceasing. In large optical defects this effort may be relaxed. The fact that hypermetropic subjects usually have excellent vision makes this defect especially difficult to deal with, as parents and teachers are not inclined to attribute headaches and other signs of nerve exhaustion to eyes that see as well as the best. How great a strain there may be under such conditions is shown by two cases which recently came to the writer's notice.

A young man, a student, had the normal vision of twenty twentieths. Under a mydriatic it fell to twenty one-hundredths, showing that only by a strong effort was he able to accommodate for even distant objects. Objects at the near point required, of course, as much effort again, thus doubling the strain.

The other case was even more exhausting to the nervous system. It was that of a young man whose vision was slightly better than normal, or twenty-twentieths plus. Under the influence of a mydriatic he was able to

see only the twenty two-hundredths line. When it is remembered that the vision of a normal eye is not affected by a mydriatic, the great effort these young men were obliged continually to exert, in order to see clearly, becomes apparent. Such a strain, continued through childhood, cannot fail to undermine the vitality of the nervous system. The fact that the effort is exerted unconsciously does not make it less exhausting. Indeed, for that very reason, the strain is more wearing because it cannot be relaxed as it could, were it a voluntary act. On this account there is a constant drain upon the energy needed for the growth of the nervous elements and for perfecting the cerebral organization.

Dr. Toms cites the case of a boy of twelve who suffered from intense morning headaches. "Both father and mother were far-sighted. The patient was a devoted student, ambitious to progress in his school work. I attended him for some months for headaches that would awaken him during the early morning hours, causing such intense pain that he would cry for hours. This condition persisted in spite of medication and regulation of diet . . . until it was about decided by his parents to take him out of school, although his physical condition was vigorous, and his health otherwise uniformly good. Before taking the step his eyes were examined." With the correction of the error of refraction found by the oculist, "he improved so rapidly that he gained ten pounds in weight within six months, and school work was subsequently extremely easy for him. I have seen him within a week," continues Dr. Toms, and "he is about to graduate. It is now three years since this examination was made, and he informs

me that he has never been troubled since with his former affliction."[1]

Dr. James Hinschelwood holds that "ocular headache due to eyestrain is certainly one of the most common forms of chronic headache. Judging from my own experience and that of others," he says, "I am quite certain that at least fifty per cent. of the cases of chronic headache met with in ordinary practice are due to this cause."[2] This factor is likely to be missed because "headache is often produced by a very slight error of refraction, which scarcely interferes with the patient's visual acuity. . . . In astigmatism and hypermetropia there is a constant strain on the part of the ciliary muscles to counteract the refractive error, and this strain is the cause of the headache."[3]

Dr. M. W. Zimmerman has made an extended and careful statistical study of reflex neuroses, and finds refractive errors or ocular imbalance a probably prolific cause of headache, epileptiform attacks, vertigo, abnormal head position and blepharospasm.[4]

"I am still seeing patients," said Dr. Risley, "who have passed into middle life, having from youth been the victims of headache, who are cured of their life-long malady by the correction of ocular defects, the real cause of their suffering never before having been suspected by themselves or by their physicians."[5] Dr. Risley cites an extreme case of a man who suffered excruciating headaches culminating "in loss of consciousness, convulsions, frothing at the mouth, and

[1] *The Medical News*, Vol. LXXVII, 1900, p. 690.
[2] *The Glasgow Medical Journal*, Vol. LXI, 1904, p. 9.
[3] *Ibid.*, pp. 9, 10.
[4] *New York Medical Journal*, Vol. LXXVIII, 1903, pp. 973, 1040.
[5] *Philadelphia Medical Journal*, Vol. IV, 1899, pp. 569–570.

wounding of the tongue, after which he would fall into a profound sleep, often lasting for several hours, from which he could not be aroused."[1] Dr. Risley corrected his eyestrain, and when he saw him eight years later, found that the headaches and convulsions had entirely ceased since the treatment of his eyes.

Muscles cannot act unceasingly, as they must in uncorrected hypermetropia and muscular imbalance, without becoming fatigued and in time exhausted. If this condition continues, the muscles finally lose their recuperative power, and the condition becomes pathological. In organs that require continuous muscular control, as in the heart, the action is intermittent, and, in this way, the rest needed for the preservation of muscular tonicity is secured. The human eye has evolved under conditions that called for distant vision. Primitive man used his eyes preponderantly for objects remote or coarse. With the discovery of writing and printing all this suddenly changed. It is one of the fundamental principles of evolution that new conditions call for new adaptations, and the beginning of writing and printing is still very recent, when considered from the standpoint of adaptive requirements. Some of man's organic diseases arise from the strain upon the organs that have not yet adapted themselves to the upright position, and yet man has been a biped very many times longer than he has been a reading and writing animal. With the change from rural to urban life the conditions requiring near vision again made rapid strides, with accompanying additional eyestrain, and the eye has not had time to adjust itself evolutionally to the new situation. In other words, an eye

[1] *Philadelphia Medical Journal*, Vol. IV, 1899, p. 569.

adapted chiefly to distant sight, with only short periods, if any, of near vision, is suddenly called upon to reverse its habits.

As early as 1874, Dr. Weir Mitchell recognized the seriousness of eyestrain. "The strain caused by the various forms of astigmatism," he said at that time, "I have often seen cause headache, but slight insufficiency of some of the intraocular ball muscles is far more likely to give rise to it. Indeed, I could relate case after case of this kind. In all of them the headache comes by degrees, and it is at first found only upon long use of the eyes. By and by, almost any eye use causes pain. The over-effort made to correct or accommodate and converge or diverge the eyes at first causes pain only on such effort, but at last the teased brain gets to aching when the patient is not trying the eyes, when he is thinking, or doing a little mental arithmetic, or the like."[1]

Function precedes adaptive structure, and mal-function precedes and produces pathological structural conditions by its very functional disturbance. In Gould's opinion, "weariness, alternating with hyper-excitability, truancy (escape from ocular labor), morbid introspection, nameless torments and self-tormentings, diseased habits, hopelessness, melancholia, manias, incipient and functional insanities, and indirectly occupational failure, crime, and many other errant trends,"[2] may follow in the wake of brain-fag and nervous breakdown caused by the nervous irritation which results from the morbid ocular struggle. Indeed, Gould ascribes the suffering and nervous peculiarities of Swift, Nietzsche,

[1] *The Philadelphia Medical and Surgical Reporter*, Vol. XXXI, 1874, p. 83.

[2] *Popular Science Monthly*, Vol. LXVII, 1905, p. 744.

Parkman, George Eliot, Carlyle, Whittier, Darwin, Wagner, Taine, Symonds, Heine, De Quincey, Huxley, Lewes, Margaret Fuller, Jules Verne, de Maupassant, Balzac and Berlioz, directly or indirectly to eyestrain.[1] The fifth volume of his series, which has recently appeared, is perhaps the most convincing, because it contains specific cases in which the effect of correction of ocular defects has been followed and observed. In connection with Gould's belief that crime may often be indirectly caused by eye defects, the examination of the eyes of the inmates of the Elmira Reformatory by Dr. G. M. Chase[2] is significant. Only thirty-one and one-half per cent. of those tested were found to have no serious error of refraction or disease. These figures become even more striking from the fact that, on account of the difficulties involved, the muscles were not tested unless the imbalance was sufficient to cause diplopia.

In considering the insidiousness of eyestrain it is interesting to find a California physician, Dr. G. S. Hull, of Pasadena, saying that "among the many invalids who seek our southern California climate, there are a few nervous wrecks who find but little help until, by some stroke of good fortune, they fall into the hands of an oculist; and when he has acted his part the climate has an easy time in finishing the cure, for which it generally gets the biggest share of the credit."[3]

In looking over the medical literature one is struck with the importance that general practitioners are attributing to eyestrain. Dr. George H. Thomas says

[1] *Popular Science Monthly*, Vol. LXVII, 1905, p. 747, and Gould's *Biographic Clinics*.
[2] Reprint from the *Ophthalmic Record*, Nov., 1906.
[3] *Ophthalmic Record*, Vol. XI, 1902, p. 27.

that the result of his professional practice is the "settled conviction that one of the most important organs in the body capable of producing a great variety and degree of neurotic symptoms is a pair of eyes affected with some refractive error or some want of balance of their external muscles." [1] Among these neuroses he mentions in order of frequency "neurasthenia (which might include insomnia, irritability, weariness, and mental confusion), nervous dyspepsia, vertigo (including some forms of car-sickness and sea-sickness), and finally migraine." Some years ago, Dr. George T. Stevens made the same observation when he wrote that "difficulties attending the functions of accommodating and of adjusting the eyes in the act of vision, or irritations arising from the nerves involved in these processes, are among the most prolific sources of nervous disturbances, and more frequently than other conditions constitute a neuropathic tendency." [2]

The recognition that so-called organic diseases are often not organic but functional reflexes, resulting from abnormal nerve impulses that have their origin in irritated nerve centres, makes the subject an important one for students of child psychology. So long as the irritation continues the centres can send out only erratic impulses which are followed by functional disorder. Naturally, the child cannot do his school work. The nerve energy required by the brain is exhausted in attempts to meet unnatural calls made upon it by such organs as are the immediate recipients of these disordered impulses.

Teachers should understand that unwillingness to

[1] *The Northwestern Lancet.* Vol. XXIII, 1903, p. 188.
[2] *Functional Nervous Diseases, Their Causes and Their Treatment,* p. 21.

study and a decided preference for mischievousness do not necessarily mean that the child is the incarnation of original sin or that he is possessed of the devil. The devil may be cast out by correcting the child's hypermetropia. Children, who can focus their eyes for near objects only by a constant and severe effort, cannot be expected to enjoy studying.

"The facial twitchings of school-children, with brow-pain, irritability of temper, restlessness, inability to sit quietly for a moment, disturbed sleep, precarious appetite, all of which makes them the despair of their mothers or teachers, I have many times seen relieved," says Dr. Risley, "by a pair of glasses. Whether these cases are to be classed as petit chorea or not, it is certain that the eyestrain was for them the 'thorn in the flesh,' which produced a constant irritation of the nervous system."[1]

A strain that, according to the more progressive pathologists, may cause many of the most serious nervous diseases, culminating sometimes in nervous prostration, chorea, epilepsy, and some forms of insanity, cannot longer be ignored by educators. The careful observation of children by those trained to read nerve signs is of fundamental importance in order that possible causes of reflex diseases may be remedied before the nerve centres become habituated by continued irritation to abnormal action.

During adolescence the demand for nerve force is great. Bodily changes are rapid and, with the best conditions, nerve centres are under heavy strain to supply the needed energy. When work is improperly done it uses up a great deal of energy wastefully. Irri-

[1] *Philadelphia Medical Journal*, Vol. IV, 1899, p. 571.

tated centres send out abnormal impulses which result in deranged functional activity of the organs. The organs strive to do their work as it should be done, and in their blind effort to preserve the integrity of their activity they call for more nerve energy; but the centres, because of their derangement, are able to give them only impaired impulses.

A badly led army needs a great many more men than one commanded by a military genius. Even with overwhelming numbers it meets the enemy only to be defeated, and an urgent call is sent in for reënforcements. But numbers will not atone for deficient leadership. In fact, their excess only adds to the confusion and demoralization. It is the same with the functional activity of organs. Deranged centres can send out only deranged impulses, and these, in turn, can give only a deranged product, and, however persistent the call for more energy, it will serve only to increase the functional disorder so long as it comes from a disordered centre.

The pharyngeal vault and nasal cavities are also sources of reflex disorders.

Adenoids are an exaggeration of normal growth of the lymphoid tissue composing the pharyngeal tonsil. This tissue is normal in childhood. It appears about the fourth month of fœtal life and continues through early childhood, but should have been absorbed at about sixteen years of age. As soon as it begins to grow it becomes pathological, because in swelling it extends forward into the nose, often closing it as effectually as a stopper closes the entrance to a bottle. Under these conditions the sleep which should be restful is disturbed by the work of breathing, and so hard is this at times that the child sweats throughout the night from

muscular exertion. Energy that should go into growth is spent in the effort to breathe. Naturally, the child is tired through the day. Not only has he lost the night's rest, but in addition has used up his surplus vitality in merely breathing. Normal growth, under these conditions, is of course impossible because of exhausted vigor. So the child is undersized. The pharyngeal tonsil lies between the Eustachian tubes, which are the outlets for the ears into the throat, and when it enlarges, it encroaches upon these so as to produce deafness. Statistics show that ninety-five per cent. of the deafness of children is thus caused. Deafness, even though slight, added to the lassitude resulting from a depleted nervous system, makes the child stupid in school as well as inattentive, and all the time his teachers are wondering why he will not do his work. When relieved of these adenoids, children invariably grow brighter, and not infrequently begin to develop physically with an almost incredible rapidity, sometimes growing six inches in six months, and taking on weight proportionately.

A few cases from the records of a practising physician[1] will show the significance of these reflex disorders.

Case 1.—Girl, age fourteen years. Mouth-breather and deaf. Six months after removal of adenoids she had grown three inches. Her deafness also disappeared, and she showed great improvement in her school work.

Case 2.—Girl, age eleven years. Mouth-breather and considered stupid in school. With the removal of the adenoids she grew six inches in about four months, and at the same time made unexpected progress in school.

[1] The author is indebted to Dr. Greenfield Sluder of St. Louis for the notes of several of the cases cited here.

Case 3.—Boy, age twelve years. Mouth-breather and undeveloped. In three months after the operation he had gained remarkably in weight and strength.

Case 4.[1]—Girl, age eighteen years. This girl had severe headaches on an average of two or three times a week. Treatment for atrophic rhinitis and chronic naso-pharyngitis resulted in a complete cure.

Case 5.—Girl, age four years. The child was a delicate little thing, with her mouth always open. When asleep she snored and was extremely restless, and when awake she looked very stupid. After removal of the adenoids she became active, looked alert, and began to grow rapidly. At the time of the last report she was a large, healthy girl.

Adenoids have a most unfortunate effect upon the faces of children. Interruption of nasal breathing compels the child to keep his mouth open, and as a result the muscles become relaxed, and the face assumes a flat, insipid appearance. If the adenoids are removed in time, the face again resumes its distinctive lines of individuality.

Case 6.—Girl, age twelve years. She was pale and sleepy-looking, with mouth constantly open, and altogether giving every indication of poor development. Her face was so expressionless as to give her an almost idiotic look. She was hard of hearing, very careless of her personal appearance, and in her school work quite stupid. After the adenoids had been removed, and other needed nasal treatment given, her face underwent so complete a change that, quite unexpectedly, as her friends report, she was transformed from the homeliest girl of her school into the most attractive. She began to grow rapidly, and soon became as animated and bright as before she had been lethargic and dull. In her personal habits, also, a radical change was noticed. Instead of untidiness in dress, neatness now characterized her, so great an influence over one's habits does bodily feeling exert.

Case 7.—Girl, age ten years. This child was dull in school, and her mouth-breathing gave her the usual stupid look. When the

[1] Reported by J. W. Jerney in the *Medical Record*, Vol. LV, 1899, p. 353.

adenoids were removed and she was able to breathe freely through her nose, her school standing improved at once, and her stupid appearance gave way to a vivacious frank expression.

Case 8.—Girl, age eight years. She was listless in school and unable to understand what was explained to her or to learn her assigned lessons, but as soon as the operation was performed, all this changed, and she had no further difficulty with her school work.

Case 9.—Boy, age nine years. This boy, who was quite deaf, had such a flat, expressionless, frog-like face, that his neighbors thought him an idiot. Removal of unusually large adenoid growths changed not only his facial expression, but his disposition as well. Previous to the operation he had been cross and selfish. Now he became gentle and kind-hearted, and with the return of his hearing and the rejuvenation of his physiological functions, his intelligence greatly increased.

I am acquainted with a young man who, when a boy, was conspicuous chiefly for his dullness. He stopped growing, and his friends lost hope, fearing he would remain dwarfed. His mouth-breathing, to which no attention had been given before, finally led to an examination by a specialist. The pharyngeal vault was found so filled with adenoid vegetation that the respiratory organs could hardly force air through. These growths were removed and the boy grew six inches during the following year. His whole mental condition underwent a marked change. He ceased to be stupid.

A child with polypoid growths in the nasal cavities is not in condition to do good brain work. He is inattentive and dull. His dullness, however, is not proof of deficient mental power. He feels uncomfortable and stupid, without knowing why. His nerve energy is used up in nourishing diseased tissue, which, in turn, reacts as an irritant upon the brain, causing it to send out abnormal impulses to other organs. In this way

functional derangement spreads, and no one knows what ails the boy. "Headache, mental dullness, bad memory, languor, lassitude, defective nutrition, and stunted growth are some of the results of post-nasal vegetation,"[1] and when once this is recognized and acted upon, many of the so-called nervous headaches will disappear, and children will no longer work against the resistance of physiological irritation.

"The symptoms of adenoid vegetation vary according to the amount of hypertrophy and the size of the naso-pharynx. The patient usually keeps the mouth open, and thus acquires a stupid expression; snoring during sleep is common; the features are often sharp, and the palate arched. A constant tendency to catch cold exists, and the patients are often said to be absent-minded. Guye states that many children afflicted with adenoid vegetation are unable to fix their attention, and hence have difficulty in learning."[2]

Adenoid vegetation in the pharyngeal vault is a source of infection and is liable to affect the brain. Whether its influence on the brain is wholly due to sympathy, or to the interference with the proper drainage of the lower cells of the brain, or whether, as has been maintained, there is a fibrous connection between the Luschka's tonsil and the brain, is unimportant. That any hypertrophy in the pharyngeal cavity renders children unfit for school work and causes reflex functional diseases is a fact which teachers should not overlook.

These growths, if not removed, may result in permanently impaired hearing. "The patient often com-

[1] Dr. David McKeown: *British Medical Journal*, 1900, Vol. II, p. 894.
[2] McBride: *Diseases of the Throat, Nose and Ears*, p. 336.

plains of tickling or scratching sensations in the throat, of snapping sounds heard during mastication or deglutition, of fatigue in listening, and difficulty in hearing during general conversation, though he may readily understand one person talking alone; and often of noises in the head and giddiness."[1]

"No symptom of the disease possesses greater importance, or requires more thorough appreciation and study, than that of ear complications, occurring, as they do, early in life, and at a time when only their prompt recognition may save the patient from permanent loss of hearing. The proportion of cases which escape ear trouble is small."[2]

Mental inefficiency may result from functional derangement occasioned by the continued effort of the brain to do its work under diseased conditions. Nerve impulses may be obstructed or diverted by the physical condition of the nerves through which they pass. Since the brain is, first of all, a physical mechanism, and as such cannot be exempt from physical limitations, mental efficiency rests primarily upon a vigorous nervous system healthily environed. Teachers should know the part that reflex neuroses play in mental hygiene, and in their preparatory training they should learn to recognize the indications of these affections in order that the nervous irritation may be relieved before it becomes a serious menace to brain growth and mental development.

[1] Ingals: *Diseases of the Chest, Throat and Nasal Cavities*, p. 611.
[2] Bosworth: *Diseases of the Nose and Throat*, p. 302.

CHAPTER V

SOME NERVOUS DISTURBANCES OF DEVELOPMENT

The changes which the nervous system of children undergoes after seven or eight years of age are essentially developmental. The brain has now attained ninety per cent., or more, of its maximum weight, and, though measurements show further enlargement, this increase is comparatively slight and wholly inadequate to account for the amazing expansion in mental capacity which begins at about this time of life. The length of time required for perfection of function varies for different organs. Those that are concerned with vital processes must, of course, mature very early, and with them comes the organization of the spinal nervous centres essential to their control. The growth of the complex structures of the cortex, in which the physiological processes that underlie the higher mental functions occur, and the differentiation of these functions, belong to the formative period of childhood, and the higher an animal stands in the evolutional series, the greater the length of time needed to complete this development. This is required by the increasing uncertainty of the environment. Animals that are born fully developed are incapable of sudden adaptive changes. Their nervous systems are built to explode in definite ways, and the appropriate stimulus is the

igniting spark. A ready-made nervous system ceases to be efficient the moment the environment becomes changeable or the production of offspring drops below the point of compensatory supply. Nervous structure must keep pace with the growing complexity of surrounding conditions; and, as man was born amid the throes of climatic convulsions, a nervous system with fixed reactions could not meet his needs. The higher nervous structures—those which appeared latest in the evolutional process—are the last of all the organs of the body to become functionally perfected, and somewhere, hidden within their recesses, lies that which marks the difference between man and the highest animals below him.

The incomparable difference in mental capacity between the child of seven, when the brain has so nearly reached its maximum size and weight, and the adult, indicates corresponding neural changes, though our knowledge of the nature of tissue-anabolism during the growth process is at present exceedingly meagre. Rudimentary cells must develop and become capable of functional activity, and the labyrinthine system of intercellular fibres—association paths—must be organized. All this requires time, and it is because of its long period of immaturity that the nervous system is so sensitive to its environment. The heads of children living in tenement houses, for example, are smaller than those of children in healthier surroundings. No organ while developing is able to offer much resistance to disease. Continual change in chemical and molecular structure makes its derangement easy. Its tissues have not yet acquired the firmness that, a little later, will enable it to hold its own against the strain which

now so easily breaks it down. During childhood the constituents of the nerve-cell are in a condition of unstable equilibrium. Its superabundant energy is overprone to discharge, and this disruptive tendency makes the inroad of bad heredity easy, and exposes it, defenceless, to the onslaught of disturbances incident to growth and development.

Education is not merely the training of cell-structures through the inertia of their inherited qualities. The development of each individual brain is as truly an evolution as is that of the race. Investigation has shown that instincts do not appear until called out by the appropriate stimulus. If the stimulus is delayed beyond their nascent period, these instincts may never appear. Hodge has found[1] that the "untamable" ruffed grouse can be domesticated. His investigations prove beyond question "that a grouse chick hatched in an incubator or under a hen, from an egg taken from a nest in the woods, is every whit as 'tame' as a chick of the domestic fowl; and it remains so until it experiences something to make it 'wild.'" Clearly, education, in a large sense, has much to do with the actualization of qualities and characteristics, even when they have behind them the impelling force of racial heredity. Undeveloped nerve-cells are always found in human brains, and probably no one will venture to assert that they were all predestined to remain half formed and useless. The inference that their growth was checked by poverty of stimuli or by derangement through nervous disturbances is not unreasonable, especially when it is remembered, as has previously been shown, that the same condition of arrested development, only ex-

[1] *Country Life in America*, April, 1906, p. 686.

aggerated, is found in the centres for sense organs whose use was lost in early life. It is probable that each area of the cortex has its own time for developing, which, in turn, is determined by need for functional activity, though our knowledge of the manner and time of growth of the different parts is still very inadequate. The critical period, when growth to functional perfection may be interrupted by nervous disturbances, is, of course, greatly extended by this prolongation of cerebral development. Any disturbance at this time is disastrous, not alone in arresting growth, but also in opening paths of nervous disorder. As nervous energy, like other forces, tends to take lines of least resistance, these erratic impulses easily become habitual. Functional derangement often continues for no other reason than because it began. A large part of a physician's work consists in helping organs to function rightly until the old habit has been broken and a new one acquired. A better way is not to let them acquire diseased habits.

"Chorea is essentially a disease of childhood."[1] "The vast majority of cases develop between five and sixteen years of age."[2] In the great majority of cases, the first attack occurs between five and ten years of age, and after this, although second attacks are not uncommon, primary attacks are rare. Chorea is believed to be an infectious disease of bacterial origin. If this is true, the disease cannot be inherited in any other way than as a neuropathic predisposition. There may be a bacterial invasion of the central nervous system, or even of the cortex, but these cases are probably in-

[1] Putzel's *Functional Nervous Diseases*, p. 1.
[2] Church and Peterson's *Nervous and Mental Diseases*, p. 530.

frequent. The disease is believed to be usually caused by bacterial inroad into some other part of the organism. As in all other infectious diseases, lowered vitality, lessening, as it does, resistance, renders the subject especially susceptible to attack. For this reason the disease often follows in the wake of measles, chicken-pox, rheumatism, and diphtheria.

The first beginnings of chorea in children are frequently misunderstood and thought to be the result of perverseness. A child, when in school, is seen to be restless and to move nervously from side to side in his seat. If observed more closely, the muscles of the fingers or hands may be seen to twitch, and the child is likely to drop his pencil, or slate, or any other light object which he may be holding. In addition, indications of mental disturbance may be detected, either before or at about the same time as the muscular irregularities appear. "These symptoms consist of a slight loss of memory, and inability of the patients to apply themselves to their studies as well and continuously as formerly. Children who were previously of an obedient and mild disposition become irritable, obstinate and perverse. They become insubordinate, lose their love of play, and are not so affectionate as was their wont. These phenomena are naturally looked upon as indubitable evidences of wilfulness, and are punished accordingly, thus frequently precipitating and aggravating the course of the disease."[1] The psychical symptoms of chorea are of such extreme importance for parents and teachers, and so likely to be misinterpreted, that it has seemed best, at the risk of some repetition, to quote from one of the latest writers

[1] Putzel's *Functional Nervous Diseases*, p. 1.

on nervous diseases of early life. Where the onset of the disease is gradual, "the appearance of the abnormal movements is preceded by alteration of the mental and physical condition of the child. She becomes more nervous and more impressionable than before; she is irritable, and often laughs and cries without apparent cause. Her facial expression is mournful, she is increasingly unable to apply her attention, and she cannot do her lessons. At this time, careful scrutiny will detect slight involuntary movements of the face and of the fingers, often unilateral in distribution. She becomes clumsy in her movements—overturns her glass at the table, and lets fall objects which she is holding. The inevitable reprimands which she suffers for these faults have an immediate effect in augmenting her clumsiness. . . . She may become capricious, irritable, and obstinate, and in many ways troublesome. Her memory may be impaired. She takes less interest in her surroundings, and this may progress until marked hebetude exists."[1]

Movements often occur first in the face, and here they are always bilateral. The less noticeable movements, such as are seen in the early stages of the disease, take the form of twitches in the corners of the mouth and in the lips. In more severe cases the strangest distortions may be seen. "At one moment the angles of the mouth are drawn downward, then turned outward, then the lips are pursed. The forehead is thrown into wrinkles, the eyebrows are brought together, then are released, and the eyes blink. Suddenly the face becomes passive, in the most forlorn expression, to break into a smile or an ugly grimace a moment later. . . .

[1] James Taylor: *Nervous Diseases in Childhood*, pp. 228–236.

The hand is the next to follow, and the left hand is affected earlier and more often than is the right."[1]

The first symptom of chorea to attract attention may be incoördination of voluntary movements. This is most noticeable in the lack of precision of the hand and forearm. At this stage of the disease there is always evidence of more or less insufficiency of muscular control. The child has difficulty in innervating the required muscles, and when, with a supreme effort, he finally succeeds, the movement is intermittent and accompanied by other useless innervations, showing a purposeless diffusion of nervous energy. Sometimes only one side is affected, and a voluntary movement on the normal side of the body is accompanied by a similar involuntary one on the abnormal side.

The arm movements of choreic children are often made with a flourish. If told to shake hands, instead of putting the hand straight out, like normal children, they first wave it around a trifle. If the child sits in a chair, with his hands resting flat on his knees, and counts ten aloud, the fingers will be seen to twitch, even after he has been cautioned to hold them still. If told to put out his tongue, he usually thrusts it out, and, while out, it often writhes and squirms in a characteristic manner. When told to put it back, the child withdraws it quickly and closes the mouth abruptly.

Some slight deflection from the normal disposition is often the first indication of approaching nervous disturbance. Frequently the change betrays itself only during the excitement of some task requiring the mental effort of attention. As will be seen from the cases cited below, the disease is sometimes accompanied by un-

[1] James Taylor: *Nervous Diseases in Childhood*, pp. 228-236.

usual mental activity, at times passing rapidly into striking excitability. On the other hand, inactivity or stupidity may exist for some weeks before the seriousness of the change attracts attention. The choreic movements may, at first, be so slight and so general as to be considered only restlessness or fidgetiness. Most children are often unconscious, or only half conscious, of their disabilities, and this should always be kept in mind in dealing with them.

Through the kindness of several alienists,[1] the writer is permitted to cite cases from their records.

Case 1.—Girl, age ten years. The child was bright and well-advanced in school, when, without any discoverable reason, she suddenly began to be listless and emotional. The change came so gradually as not at first to attract unusual attention, especially as, at first, the remonstrances of her teachers and parents seemed to have good effect. Later, however, when scolded, she became so excited that she was removed from school. By this time her lethargy had caused her parents to consult a physician, who discovered that her left arm and leg were becoming weak. Within a short time choreic movements developed in the left side. This proved to be a tedious case of chorea, from which, however, the patient finally entirely recovered.

Case 2.—Boy, age ten years. Choreic movements began in the right hand, and soon the entire right side of the body was affected. Later, his right hand became weak and he dropped articles which he was holding. His tongue also showed the characteristic choreic movements. He was taken from school and recovered, under treatment, in three weeks.

Case 3.—Girl, age nine years. The child had never been sick before. Her attack began with twitching of her fingers, and muscular weakness and lack of coördination caused her to drop things. She broke dishes and was punished for it. This made matters worse, and now her arms and legs made random movements, so that she bruised herself. A little later her inability to coördinate made it necessary to feed her. With rest and treatment she recovered four weeks after a physician was consulted.

[1] For the reports of the cases not otherwise credited, which are cited in this chapter, the author is indebted to Drs. Frank R. Fry, William W. Graves, and Given Campbell, Jr., of St. Louis.

Not infrequently, the attack will be preceded by complaint of rheumatism, or of "growing pains."

Case 4.—Girl, age six years. The movements, which the physician recognized as choreic, were first noticed by the child's parents about two weeks before he was consulted. During the five preceding weeks she had suffered considerably from rheumatism, but no one had thought of its possible connection with approaching chorea.

Case 5.—Girl, age eleven years. For six months she had complained of headache and severe pains in her knees and elbows, the latter of which her parents ascribed to growth. Three weeks before the physician was consulted the child began to drop small things. When she was seen by the physician chorea was clearly manifest. She was taken from school, placed under treatment, and recovered in six weeks. A second attack, which promptly yielded to treatment, occurred a year later.

Case 6.—Boy, age twelve years. He complained to his mother of a good deal of "aching," but little was thought of it, and he continued to attend school. Later, he told his mother that he could not write well—was too nervous—and that his school-mates were helping him write his exercises, because his hand trembled. He had been severely reprimanded by his teacher for inattention and for little disturbances in school. His mother called upon the teacher to ask the cause of the trouble, and was told that the boy was "just bad"; he learned his lessons so easily, she said, that he had too much time in which to be mischievous. One evening, when at home, a spring-bed creaked, and at once the boy collapsed nervously. From that time chorea was declared.

Frequently, it is the bright, precocious children who show choreic symptoms. Their nervousness is often a feature of their brightness. They are able to accomplish a good deal in a short time, and so their teachers are apt to urge them on, though they are just the ones who should be restrained in their mental development.

Case 7.—Girl, age eight years. For a month, or more, the child had complained of aching "all over," but the pain was especially severe in her ankles and knees. Her parents thought that she had growing pains, and a physician, who was consulted,

prescribed a tonic. She continued to attend school, and her teacher remarked that she was very bright in her studies. Meanwhile, she was observed to open and shut her eyes so nervously that she was taken to an oculist, who at once recognized chorea, and advised that an alienist be consulted. Three weeks passed, during which time the eye movements grew worse and, in addition, general restlessness became noticeable. When she was finally taken to the alienist, choreic movements were general. On his advice she was at once removed from school, but, up to the time of leaving, her school work was of an unusually high grade and her deportment entirely satisfactory.

Case 8.—Boy, age thirteen years. This boy greatly annoyed his parents and teachers by a sort of snorting and sniffing. He was often chided, but without effect. Finally, however, it became so annoying that the boy was taken to an alienist, who at once detected chorea. During all this time the lad was distinctly bright in his school work.

At times the emotional side of the malady is prominent, and the manifestation of the disease may then follow a comparatively slight shock.

Case 9.—Boy, age thirteen years. The attack followed the extraction of a tooth. Choreic movements were evident in both sides of the body.

Case 10.—Boy, age twelve years. The first noticeable peculiarity was a pharyngeal click. His parents and teachers thought it nothing more than a vicious habit, and they tried to make him stop it, but without success. Meanwhile, things did not go right at school. The boy was nervous and fidgety, and wholly incapable of concentrating his attention. The most trivial annoyance would cause him to burst into tears. When seen by the physician, choreic symptoms were easily recognized.

Case 11.—Boy, age eleven years. This boy had always borne a good reputation with his teachers for deportment and scholarship, when suddenly, within two or three weeks, he became involved in three or four fights with his schoolmates. Investigation showed that in each case he had been the aggressor. These misdemeanors were leniently dealt with because of his previous good record at home and at school. A little later, however, another exceedingly vicious attack upon a classmate would have caused his expulsion, had not his father asked the privilege of quietly withdrawing him. In his home, also, the boy had begun

to show capricious irritability and emotionalism, crying at the least provocation. This case well illustrates the fact that emotional symptoms of the disease may precede the characteristic movements. Not infrequently, in school children, chorea is preceded by a condition of irritability, which is quite commonly misinterpreted, and, as a result, mental derangement is liable to be more firmly established.

Case 12.—Girl, age sixteen years. This girl was exceptionally healthy looking, and intelligent and bright as well, as is so likely to be true of choreic children. Shortly before the time of which we are speaking, her teacher noticed, with surprise, that she was falling behind in her work. Her mother, also, had observed that she was losing her wonted vivacity and becoming indifferent to her work. Meanwhile, though protesting that she was perfectly well, the girl began without cause to exhibit emotional outbreaks. For no observable reason she would burst into tears, and about this time choreic movements began to appear. At first the motor disturbances occurred only during her emotional attacks, but soon they became constant, and then the cause of her trouble was apparent. Removal from school, with out-of-door life, effected a cure in about two months.

Case 13.—Boy, age six and a half years. This child was in the kindergarten, and had always been well behaved at home and at school. Quite unexpectedly he began to exhibit inexplicable tantrums, the tendency to which would last for several days, and then he would again relapse into his usual good behavior. This alternation in conduct was so pronounced as to attract the attention of the mother of the boy, as well as that of his teacher. During these tantrums, the child was raging mad and wholly uncontrollable. Then, no less suddenly, he would become gentle and tractable. This condition continued for more than two weeks before choreic movements were pronounced enough to cause his parents to confer with an alienist. He was at once withdrawn from school, and recovered in about ten weeks.

The cases cited above were taken from the records of alienists, and for that reason may be thought to have been unintentionally colored by the physicians' interest in nervous diseases. Unfortunately, such cases are not uncommon. One physician, in a letter to the writer, says: "I frequently see choreic children on the streets

and in the street cars. In some instances the manifestations are not very pronounced, but they are readily detected by the practised eye. There is considerable variety in these movements, both in their location and intensity. The disease may be first manifested by slight grimaces, often by general restlessness, which make it impossible for the child to subside into a restful position. In the vast majority of instances, the presence of choreic movements should be the signal for removing the child from school."

Conversation with any thoughtful teacher will show that the condition has not been exaggerated. The following cases, taken from the writer's note-book, were described to him by teachers:

Case 1.—Girl, age eighteen years. "This girl," says the teacher, "has been under my observation from the age of thirteen to eighteen. During this time nervousness was manifested by a quick, jerky manner of speech following a hurried, breathless beginning. The sentence would then die away, without any coherent ending. While reciting or conversing, her face twitches, and abrupt movements of the shoulders and shuffling of the feet are quite noticeable. These peculiarities are more marked when, for any reason, her general health is unfavorably affected. Rest and freedom from school duties benefited her, but did not effect a complete cure. The girl is a daughter of a very nervous mother."

Case 2.—Girl, age twelve years. "Last year, this girl was excessively nervous. Throughout the recitation her hands and feet were in constant motion, and sometimes she left her seat from restlessness. I took no notice of her fidgetiness in class," continues her teacher, "and favored her when I could, so as to lessen the nervous tension. This quiet way of dealing with her seems to have been helpful, as, this year, she is much improved. Perhaps the excitement of a new school was in part responsible for her nervousness. Her mother tells me that she herself, when a girl, was quite nervous."

Case 3.—Girl, age twelve years. "Her entire body is in almost constant motion. She cannot stand still when talking,

and her arms and legs seem never to be at rest. Her face, also, twitches. Inability to do creditable work in history and geography seems to aggravate her nervousness."

Case 4.—Girl, age twelve years. The teacher was unable to make any essential distinction between this girl and the one cited under Case 3. The only difference was that, in this one, the choreic movements were a little less intense than in the other.

Children are especially susceptible to choreic infection because functional stability has not yet been established in their nerve centres, and, while this unstable condition exists, motor processes easily occur and run their course independently of volition.

In its acute form, chorea readily yields to treatment, provided the patient is placed under right conditions. The first requisite, however, is that the nervous system be given complete rest, and so the child should at once be removed from school. "I know of many cases," said Weir Mitchell,[1] "which get well when they cease to study, and relapse at every new effort to do school work." It is because of the danger in delay that it is so important for parents and teachers to be acquainted with the usual symptoms. "The state of disordered action, whatever be the essential cause, is sometimes ineradicably impressed upon the nerve elements, and chronic chorea results."[2]

Among the diseases of the nervous system are certain ones for which no pathological alteration in the neural apparatus has been discovered. While it is probable that neural changes of some sort also underlie these nervous disturbances, which improvement in the means for their investigation may yet disclose, so far as present

[1] *Lectures on Diseases of the Nervous System*, p. 146.
[2] James Taylor's *Nervous Diseases in Childhood*, p. 251.

knowledge goes they seem to be the manifestation of derangement of functional control. To this class of nervous affections belong tics, or habit spasms.

Simple tic, according to Taylor, is a frequent disorder of childhood, and occurs most commonly between five and ten years of age, while eighty per cent. of the cases fall between the ages of five and fifteen.

The origin of this motor affection is usually a movement voluntarily started for the relief of pain, or for some other good reason. Later, when the irritation which caused the act has disappeared, the movement, now purposeless, continues involuntarily as a tic.

"Over and over again," writes Dr. Weir Mitchell,[1] some anxious mother will ask you to notice her child on account of some little trick or gesture in which the child indulges. Then you will see that it is winking rapidly, or pursing up the mouth, or drawing it to one side, or, perhaps, that the brow is lifted at intervals, or a shoulder shrugged, or some forward movement of the jaw or head is repeated over and over, at varying intervals." Whatever may be the movement, it is likely in time to disappear and be replaced by another. The child may resist the inclination, but continued resistance brings discomfort, while yielding gives at least momentary relief. The trouble is aggravated by attracting the child's attention to the defect, or by deterioration in health.

The motor phenomena of tics are the outward manifestations of a central functional process, and, for this reason, imitation, to which the young are especially prone, plays an important part in the propagation of the disorder. If, to this tendency to imitate, there be

[1] *Lectures on Diseases of the Nervous System*, pp. 156–157.

added a highly nervous temperament, the most favorable combination is furnished for the development of the malady. On this account it is of great importance that children who exhibit this neurotic habit be removed from school, so as to prevent the spread of the disease through imitation, for, among predisposed children, nothing is more contagious. It is not necessary that the movement be continually present to start the imitation. Seeing it only once may suffice, since the novelty of a movement often fascinates children and, by holding their attention, gives the cue to the imitative tendency.

Home surroundings, as Meige and Feindel have shown,[1] are often active predisposing factors. Vacillating parents, in whom inexcusable submission to capricious entreaties alternates with unreasonable prohibitions, who are tender or harsh, patient or impatient, according to their mood, are sowing the seeds of nervous diseases; and the crop will be bountiful. Tics are often only bad habits which, if taken at the start, may be eradicated; but if, through the carelessness or weakness of parents, they be allowed to grow, they are certain to become pathological. Self-control is one of the things that tic patients need to learn—indeed, their cure, many times, consists largely in this—and the early lessons are received from the sagacious and considerate firmness of those in authority over them.

Case 1.—Boy, age eight years. For nearly a year before the conference with the physician, this lad had been in the habit of moving the left half of his face, and it was noticed that when he was fatigued the spasm was more severe. Upon the advice of the alienist he was taken from school and sent into the country, with instructions to live out of doors. After several months the

[1] *Der Tic*, Leipzig und Wien, p. 89.

movements had practically ceased, though they still occur, in a slight degree, if, for any reason, his health deteriorates.

Case 2.—Girl, age eighteen years. Until eight years of age she was strong and well. At this time, however, she became very irritable and would cry with the least provocation. Shortly after this, the girl was badly frightened at being seized and held, on the street, by a strange man, and a little later wriggling movements of the body were noticed, with sudden elevation of the shoulders, and opening and closing of the hands. Frequently, also, she would stamp her feet on the floor, whether sitting or walking. These motor disturbances were thought to be caused by chorea, and, during several years she was treated for this disease, but received no benefit. Her mother said that the movements were always more pronounced when the child was alone or occupied with her playthings. At the time when she came under the writer's observation, nearly ten years after the beginning of the disorder, the fingers of her left hand were in constant motion, the left shoulder was frequently elevated and rotated inward, her mouth was puckered at irregular intervals and her brow raised, while now and then wriggling movements of the body were accompanied by irregular shuffling of her left foot, with occasional stamping movements. As indicating some of the distinctions between chorea and tic, it was noticed that her movements were coördinated, that they could be imitated, that they did not interfere with her voluntary movements, and that she was able, by fixing her attention upon them, to inhibit the movements for a variable period of time. At this stage of the malady she could restrain the movements while counting ten, but so soon as this number was reached she lost control. When asked why she did not remain quiet longer she replied, "Oh, I just had to do it." In response to the question as to whether she felt relieved after making the movements, she said, "yes." The patient recovered completely one year after her disorder was diagnosed as tic. A part of the treatment consisted in standing before a mirror and inhibiting the movements as long as possible. At the end of a year, she was able to resist the inclination until she counted five hundred, and this marked the date of her cure. During this interval, she also practised gymnastics and spent much of her time out of doors.

Case 3.—Boy, age fourteen years. This case was reported by Dr. Weir Mitchell.[1] The boy had been removed from school because his irascibility and capriciousness, together with twitching

[1] *Lectures on Diseases of the Nervous System*, pp. 160–161.

of the face, and general nervousness, convinced his parents that something was wrong. The facial movements were somewhat irregular, diminishing when some new symptom appeared, though they never wholly ceased. The lad also rolled his head in a curious way. These disorders disappeared for a time, and then the child began, at intervals, to contract abruptly his abdominal muscles. By fixing his attention upon these movements he could restrain them for about fifteen minutes, but any slight relaxation was followed by the movement. The strain of attention and resistance was attended by discomfort. After a month or two, new movements appeared; the respiration was interrupted every few minutes by an abrupt long inspiration, and a little later he began to give his neck a sudden twist, accompanying this movement by a shake of the head. These anomalies, in turn, gave way to a shrugging of one shoulder, with an upward jerk of the whole side of the body. The last of this curious array of motor disorders was a sudden straightening of the whole body. These varying conditions endured for several years. At one time the boy seemed well, then spring-time,[1] or any little malady, especially indigestion or much study and indoor life, seemed to reproduce the trouble in some shape, new or old."

Migraine frequently first manifests itself in childhood, though it is not so common as chorea and tic. According to Gowers, one-third of all the cases begin between five and ten years of age, while two-fifths occur between ten and twenty. Its beginning is often preceded by slight pains and spasms, or by some ill-defined distress in the stomach, which the child is unable to describe, but which may lead to erratic acts. Not infrequently the malady is first disclosed by obscured vision, which supervenes in such a manner as to confuse the child. One physician reports that two children recently came under his care who, for a few minutes at a time, were unable to see writing or figures on the blackboard, but a little later saw them clearly. Their teachers, not understanding the conditions, thought that the children were shamming.

[1] Chorea and tic seem to be aggravated in the spring.

The following case illustrates in how strange a manner the attack may be ushered in:

A girl, ten years of age, and bright in her studies, suddenly began, one day, to belch and to produce a gurgling sound. She was reprimanded by her teacher, but insisted that she could not help it. Within a day or two the same act was repeated, and this time her teacher was convinced that it was done from mischievousness. A few days later a similar attack was prolonged, and as the child was evidently in distress, she was sent home with a note asking her mother for an interview. Before the mother visited the teacher the girl had suffered two attacks at home, and, as in the second of these she was in great distress, a physician was called, who pronounced it hysteria. Within a few days the child had a typical attack of migraine. When it had passed she seemed as well and cheerful as ever. Within a week there was a recurrence of migraine, preceded, as before, by the stomach disturbance.

Heredity is undoubtedly an important predisposing factor in causing migraine, but it is no less certain that, in many instances, the onslaught of the disease is due to exhausting nervous strain. This may be a partial explanation of the prevalence of the disease among precocious children. Recurring emotional excitement, fatigue, or excessive school work, especially when attended by anxiety and worry, make fertile soil for renewing the growth of morbid hereditary tendencies.

Authorities disagree regarding the frequency of hysteria in childhood, but it is probably more common than has generally been admitted. Clarke[1] says that the disorder is not infrequent in children and, according

[1] J. Michell Clarke: *Hysteria and Neurasthenia.*

to Gowers,[1] one-half of the cases occur during the second decade of life, while Ranney[2] states that a very large proportion of the cases occur at the age of puberty. Agreement is general that, in cases of juvenile hysteria, the excess of females, found among adults, does not occur. The influence of surroundings is seen in the partiality of the disorder for the only child, as well as in the frequency with which imitation spreads its symptoms among school children. Fear of failure in school work, in the case of timid children, and continued ridicule by playmates, are important exciting causes, especially with those predisposed to nervous instability, and precocious children are particularly prone to the disorder. Though quiet, retiring children are not free from hysteria, it is much more likely to occur in the highly emotional, because excitable, volatile natures indicate lack of inhibitory control, and this is favorable to the development of neurotic disturbances.

Inquiry concerning the nature of the disorder does not bring an answer that is altogether satisfactory. No pathological change in any part of the brain has, as yet, been discovered, and many of its phenomena seem to justify the view that its origin must be sought in purely psychical conditions. The mental states which exist in hysteria appear, many times, to be separated[3] from the regular stream of consciousness; they have their own groups of associations which cannot be connected with any of the ideas that constitute the normal consciousness of the individual. This break in consciousness makes it difficult, if not impossible, to influence the diseased

[1] *Manual of Diseases of the Nervous System*, p. 985.
[2] *Lectures on Nervous Diseases*, p. 507.
[3] *Studien über Hysteria*, by Breuer and Freud, and various contributions by Pierre Janet, especially *The Major Symptoms of Hysteria*.

ideas in the usual way, and renders the disorder peculiarly responsive to suggestive treatment.

Case 1.—Girl, age ten years. The child was making excellent progress in school, though she was somewhat timid in her recitations. Her mother had noticed that this timidity had increased during the last year or two, and that she was very sensitive, and cried easily when scolded. There was no history of serious nervous disease in either branch of the family, but the father was nervous and sleepless when worried about his business, and her mother was always startled by sudden noises. Shortly before the physician was consulted, the child complained to her teacher that she could not see the print in her books, but, when tested, the dimness of vision was found to be confined to the right eye. Sometimes her vision seemed normal, but, on other occasions, objects appeared black, if the left eye was closed. The first time when her field of vision was mapped, that of the right eye ranged, irregularly, between twenty and forty degrees from the point of fixation, with an average of about thirty degrees, while in the left eye, no part of the field of vision exceeded ten degrees. On the following day the right field was found to be less than five degrees, at all points. The tracing made after her recovery shows the normal visual field.

Case 2.—Girl, age twelve years. On two occasions, when leaving her class-room, her legs gave way and she fell to the floor. She arose and left the room greatly chagrined. As she was a vivacious girl, fond of joking, her parents and teachers thought that she did it to create amusement, but, meanwhile, it was noticed that she was not so well as formerly. Soon she was unable to stand and went to her bed, where she remained, except when carried about, for one year. One day, as she heard the voice of her cousin, for whom she had been anxiously waiting, she suddenly leaped out of bed and ran downstairs, and from that time she had no further trouble.

Case 3.—Girl, age eighteen years. As this girl was not progressing in her studies at school, she was taken out and placed with a seamstress, "that she might have something to do." The alienist, when consulted, found that she had hysterical anæsthesia on both sides of her face, and on her hands up to her wrists. She had been badly frightened, at eleven years of age, by the St. Louis cyclone, and her trouble dated from this, though the possibility had not occurred to her parents.

An interesting illustration of the extent to which

little children may be unconsciously affected by conditions is seen in the following:

Case 4.—Girl, age twenty-three months. The family, with the little girl, had been passing the evening with a neighbor, and, on their return, found that the house had been robbed. Naturally, great excitement prevailed, to which, however, the little child seemed to pay no attention. She was calling for something to eat. An hour later, when her mother was putting her into bed, she cried out in a paroxysm, "Mamma, see man, he's robber-man!" This was repeated every night until, finally, a physician was called.

Epilepsy is the most serious of all developmental neuroses, because of the nervous deterioration to which it usually points. Clouston puts it next to insanity, in gravity, and adds that "almost all cases of true epilepsy first arise during the growth and development of the brain."[1] Spratling's studies[2] show that the greatest number of cases occur before five years of age, and that the next, and almost equally dangerous period, is from ten to fourteen. After the age of nineteen the disease decreases rapidly in frequency. Periods of rapid brain growth, and of physiological change—the approach of puberty—are evidently the dangerous ages for this dread disease.

The great importance which some writers attach to heredity in the etiology of the malady is probably due to the fact that their statistics must, necessarily, be based on cases in which the ancestry was conspicuously bad, and this becomes evident when one sees that their conclusions are derived from patients, one or both of whose parents had some clearly defined disease of the nervous system. If, in this instance, however, we mean

[1] *Neuroses of Development*, p. 97.
[2] *Epilepsy and Its Treatment*, p. 50.

by inheritance a predisposition to serious nervous derangements, then it is probable that all epileptics inherit the disease. But the question of greatest importance here is not whether in a given case it is possible to find hereditary characteristics by which the occurrence of epilepsy, or other neuroses of development, may be explained, but it is rather whether, under such circumstances, the disease *must* appear. Positive assertions on this point are perilous, but the effect of open-air treatment on the insane,[1] resulting, not infrequently, in their complete cure, certainly indicates that we have hardly begun to avail ourselves of the possibilities for thwarting defective heredity, especially in the young, when recuperative forces are so strong.

The function of the cortical cells is the conservation of energy generated by the nutritive processes. This nervous energy, when accumulated in the cell, is available for the furtherance of the physiological changes which underlie organic and physical activities, and, evidently, the most important office of nerve centres, next to storing energy, is its economic utilization. This is the weak point in the nervous system of children. Inhibitory centres mature slowly. Action is the first requisite, and, for this reason, motor centres must develop early, and energy, uncontrolled, is diffused aimlessly through the nervous channels, influenced by only one purpose—motion—for it is by movement that the young come to a realization of their power.

With the development of inhibition, nervous action is no longer directed toward mere movement, and now sudden, unregulated discharges suggest a state of central instability which may easily become pathological.

[1] *New York Medical Journal*, Vol. LXXXV, 1907, p. 241.

Epilepsy is characterized by explosive liberation of nervous energy, without adequate stimulus. As the usual manifestations of the disease are generally known, it has been thought best to cite only one case, which is of special interest because of its peculiarities.

A little girl, eight years of age, while standing in line with her classmates during a recitation, suddenly broke away from the others and ran around in a circle three or four times, then, for a moment, looked confused, giggled a little, and became quiet. When reprimanded by her teacher she insisted that she did not know what had happened. Although unable to explain this behavior, her teacher was convinced that the child was telling the truth. At another time, when school was being dismissed, the girl behaved in exactly the same manner. As her teacher thought that she detected a momentary dazed condition, she reported the incident to the girl's mother. Soon after, the same act was repeated at home, and has since happened frequently, and become more prolonged and intense, and, on two occasions the child sank to the floor before the attack was over. It is now evident that she was suffering from epilepsy. The alienist, who reported the case to the writer, says that he has known of several similar instances among school children, and each time the automatic movements were regarded by the teacher as evidence of wilfulness.

The nervous disorders considered in this chapter belong to the group of neuroses which are classed as developmental because, if they occur at all, they make their appearance during the period of growth. Half an hour's observation of pupils at their school work will convince one skilled in interpreting nerve signs that

these maladies have become so common as to menace our national health, and the significance of this for education has been too generally ignored. It is in the stress of growth, when organic processes make the heaviest demand upon the nervous energy accumulated by nerve cells, that disorders of development are especially liable to occur. Before seven years of age, all available energy is needed for brain growth, and, after that, the adjustment of neural functions makes its claim. Soon, also, the emotions are rampant and movements are settling down to volitional control.

Nervous energy is not inexhaustible, and, if it is drawn upon too largely by the intellect, the bill must be paid from the deposit which should remain to the credit of physiological development. Happily, racial indolence often refuses to be coerced, but it is unfortunate that instincts are so frequently the child's only defence against pedagogical enlightenment.

One of the most important contributions of physiology to education is the discovery that the organization of nervous structures, in the different parts of the brain, occurs at widely separated periods. Some areas mature very early, while others are slow in attaining full development; and precocity, instead of being a source of pride to parents, should be regarded with suspicion and carefully watched. Growth, whether physical or mental, is always in danger of arrest, and brain nutrition, and the establishment of nervous stability, ought to have the first place in education. During childhood, nervous centres discharge spontaneously, and there is danger lest the habit of overflowing be fixed, and hereditary tendencies be converted into actual disease.

Education is not merely an intellectual process. The

mind and body are too closely interrelated for the intellect to realize its best when its activities are disturbed by pathological conditions. Physiological derangement is an exhaustive drain upon the energy needed for healthy cerebration and, if prolonged, is liable to arrest mental growth. Medical supervision, already an accomplished fact in a few cities, indicates progress, but it cannot fully meet the need so long as teachers are wholly unacquainted with the advance signs of developmental nervous affections. When the physician sees the patient the disease is usually well established. The important thing is to detect it in its incipiency, and this can be done only by those who are in daily association with the children. The study of the usual signs of approaching nervous disorders should therefore be a part of the training of teachers, so that the advice of the visiting physician may be secured before the disease is declared; otherwise the malady may be aggravated by over-stimulation for final tests and public exhibitions, or by continued irritation, a condition which would at once warn the teacher of danger were he but acquainted with the symptoms of central nervous disturbance.

CHAPTER VI

THE PSYCHOLOGY OF LEARNING

All questions of mental development are more or less closely concerned with the nature of the learning process—its general characteristics and specific peculiarities. The evolution of the brain has been attended with evolution of the cerebral activities involved in learning, but how close has the correspondence been during the stages of the process? What is the part that consciousness has played in this growth in power to do things, and what relation is there, if any, between the assumption of control by consciousness and the evolutional stage of the race? In other words, does consciousness take charge of the details of complex actions more frequently in higher races or does it concern itself chiefly with the larger, more general features of activities, leaving the details for subconscious guidance? This question has individual as well as racial significance and opens an immensely practical field in education.

As one of the chief difficulties in studying the process of acquiring knowledge is to find a way of accurately measuring the progress of the learner, it seemed advisable to begin with an investigation of a complex act of muscular skill. This approach to the general subject turned out to be particularly fortunate because some mental states are more conspicuous in certain activities

than in others, and for that reason are more easily detected. Besides, it is an advantage to compare activities in which the mental factor becomes increasingly prominent. Since mental processes are undoubtedly involved in whatever we do, there is no such thing as a purely physical act, but for convenience we may designate the types of learning considered here as (1) physical, the acquisition of skill in a complex muscular act; (2) physical and mental, the acquisition of skill in typewriting; (3) mental, the acquisition of knowledge in beginning a language. It should be remembered, however, that this division is intended only to emphasize the increasing prominence of the mental factors.

I.—TOSSING AND CATCHING BALLS

The feat of skill of keeping two balls going with one hand, catching and throwing one while the other is in the air, was first selected for several reasons, but the chief argument in its favor was the accuracy that it permits in measuring the learner's progress.

The balls used were of solid rubber and weighed one hundred and thirty-two and six-tenths and one hundred and thirty and two-tenths grammes. This difference was not perceptible to the experimenters. The diameters of the balls were forty-two and forty-four millimeters, respectively. Six young men were tested; five with the regular series, and one in keeping three balls going with two hands. Five of these men, to whom we shall hereafter refer as the subjects, were university students and one was a professor. Only five are represented in the curves which follow.

The daily programme consisted of ten series, the subject in each case continuing the throwing until he

failed to catch one or both of the balls. This constituted one series. The number of catches made in each series was immediately recorded, with any data obtainable as to the method pursued and the cause of failure. After each series the subject rested as long as seemed necessary, and then recommenced the throwing until the ten series had been completed. There was no practice whatever between the series, and none of the subjects had ever handled balls in this way except as the baseball and tennis player may occasionally throw a ball or two into the air and catch them as they come down. All the subjects did the work in the afternoon. In the few instances in which a change of hour was necessary, this fact was recorded. The total time occupied in the testing (and this testing constituted also the sole training of the subject) was various in amount, extending from a few minutes in the early stages of practice to two or three hours toward the end. All the subjects knew their daily score, and they always kept track of their progress during each test as well as from day to day. This method has undoubtedly given results different from those that would have been obtained had the subjects been kept in ignorance of the score, but the plan was uniform throughout, and had the advantage of largely overcoming the effect of monotony which usually depresses those who are obliged to practice continuously for so many days. Besides, it enabled observation to be made on the effect of competition both with one's own record and with that of others.

The throwing and catching of the regular tests was with the right hand (all the subjects were right-handed), but in order to ascertain the effect of right-handed practice upon the skill of the left hand, a preliminary

test was made upon each subject, on the first day of his practice, of his untutored skill with the left hand. This preliminary test consisted of ten series as usual; and after this the left hand was not again tried until after the completion of the whole period of work with the right hand, when the left hand was again tested and a record of its progress kept for a number of days.

The daily training was continued in the case of four of the six subjects until the average number of catches for each series exceeded 100, or, what amounts to the same thing, 1,000 catches in ten series, for two days in succession. In the case of the other two subjects the training was broken off at a lower score for reasons that will appear later.[1] The tests were made every day, including Sundays.

Influences that Affected the Score.—It seems probable that the weight of the balls may have had an influence on the results on account of fatigue, and tennis balls would perhaps have sent the score up faster toward the end, when the number of successive catches at times exceeded two hundred. The essential course of the curve of progress would not, however, have been altered.

At the beginning the height of the room proved to be an important element, and the one in which the experiments were made was high enough to allow sufficient freedom in this particular.

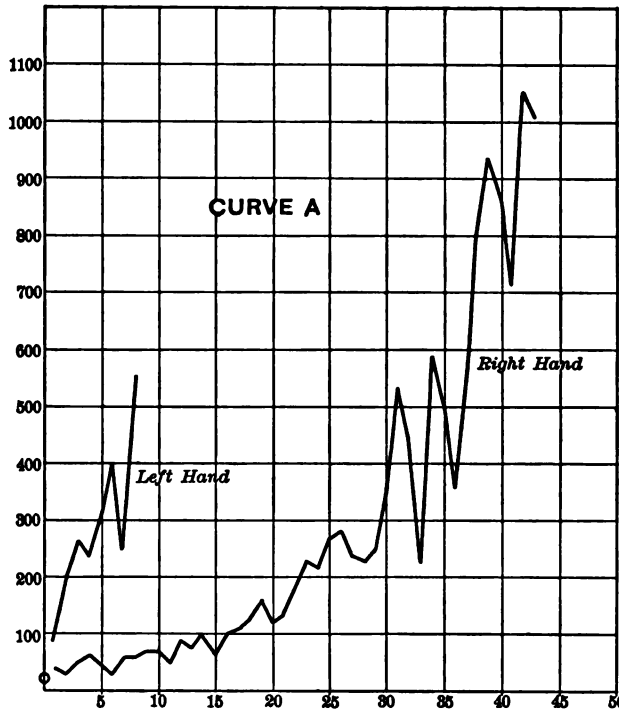
The ball-tossing proved itself an unexpectedly del-

[1] That even the lesser skill attained by these two was not bad seems evident when we find Hopkins saying that "the young man who can perform this operation twenty times without dropping one of the balls can treat the artist of the circus as a *confrère*." (Hopkins: *Magic*, p. 140.) Hopkins possibly means, however, a young man who *never* fails to reach at least twenty catches, however often he may try. If this is the case, he is speaking of a degree of skill which was hardly reached by my subjects.

icate index of bodily and other conditions. Slight changes in physical condition, or in the temperature and illumination of the room, often produced noticeable effects upon the score. This resulted in marked unevenness in the records from day to day, but did not influence unfavorably the general features of progress in which we are here most interested. Indeed, some of these disturbing elements are present at intervals in every learning process, and the importance of taking daily records of the progress in such work, instead of week by week, is apparent when we notice the great variations in skill through which most of the subjects passed.

The most frequent evidences of lack of skill in the earlier days of training were "wild throwing" (the tossing of the ball in such a way that it fell out of easy reach), and clumsy catching, *i. e.*, not being able to capture the ball when it touched the hand. As the subjects progressed somewhat, another source of failure appeared in the collision of the balls in the air, the ascending ball striking the descending one and knocking it out of reach. In the final stages trouble of this sort was again less frequent.

None of the subjects gave any preliminary thought to the manner in which they might best acquire the knack of handling the balls, and this led to individual peculiarities of method, and ways of avoiding or meeting the common difficulties. One subject found himself very early in his practice avoiding collisions by tossing the balls up a little to his right and in such a way that they would take a circular course, coming down in front of him. This method was most successful in avoiding collisions. Two others fell into the way of tossing the balls up at nearly arm's length in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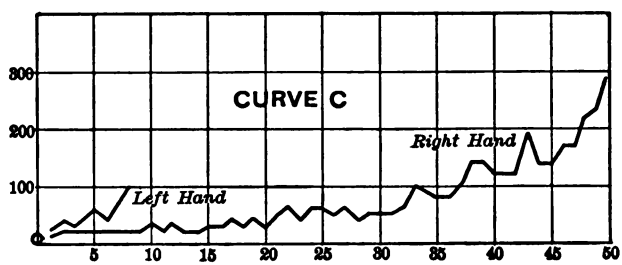
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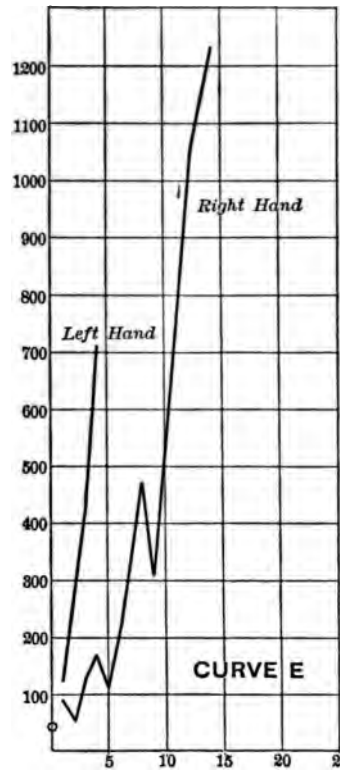
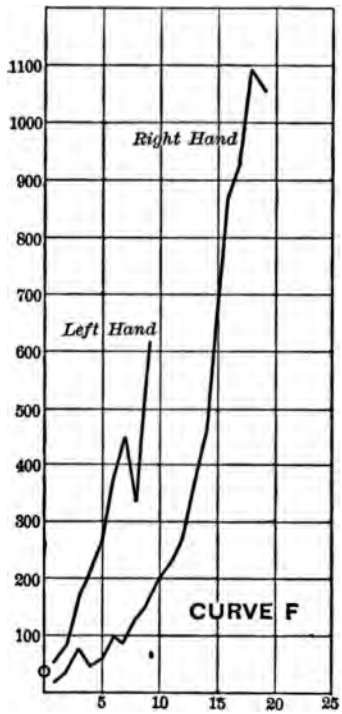
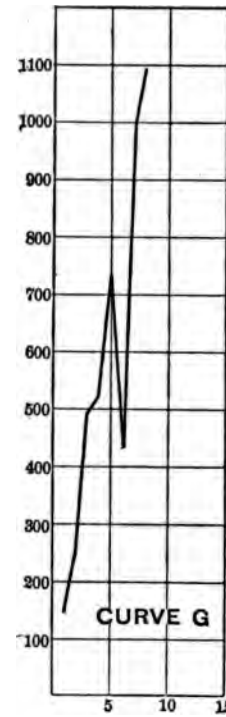
front, so that they took a circular course toward the subject, coming down closer to his body. The objection to this method was that the balls tended to fall too near the catcher, and so constantly crowded him back. The other two kept the balls in parallel columns a foot or so apart, and a little to the right of the median line of the body. With this method the balls fell into a "mix up" periodically, and then the subjects were obliged to toss high until they could straighten out the tangle, when they would settle down again into the same parallel columns, but only to have the experience of trouble repeated in course of time. The same was also true in a measure of the circular throws.



In the execution, the eyes and attention were upon the balls in the air, indeed, upon them in the upper half of their course. Both the tossing and the catching were effected with the hand, for the most part, outside the field of vision and of attention.

Results.—While full numerical data are at hand, it





has seemed to the writer that the essential features of the results could be made more easily intelligible by diagrams than by tables, and he has accordingly plotted the accompanying curves. All the curves are plotted in the same way and upon the same scale. Vertical distances show the number of balls caught; horizontal distances, the successive days. The lower curves at the extreme left present the progress of the left hand.

Discussion of the Results.—The curves just presented have certain characteristics in common.

1. In general, the curves are concave toward the vertical axis, which means, of course, that the progress was first slow and then more rapid. It is altogether probable that all of the curves would in the end sweep more rapidly to the right and show a stage of slow progress as the physiological limit of skill in such matters was reached, but none of my subjects approached that limit.

2. All the curves show great irregularity of advance. Progress is never uniform but always by jumps. The learner seems to make no gain for several days, or even longer, then he takes a leap, perhaps to get a good grip and stay, or may be to drop back a little. But if he loses his hold it is not for long, and he soon makes this higher level his starting-point for new excursions.

A growing feeling of confidence usually preceded a permanent rise. The subjects felt that they were "going to do it."

There are not one or two special periods of delay in progress, giving a "plateau" or two in the curve, as Bryan and Harter found in their study,[1] in which successful coördinations are made automatic. Instead, there are many, the number varying with different individuals, and automatization is going on during the entire learning process. Miss Shinn found this same irregularity in the attempts of her little niece to learn to walk.

3. The average skill, holding at first somewhat closely to the lowest throw, was gradually drawn away from it by the growth in skill that revealed its reach in the highest throws. Though the lowest throw did not

[1] *Psychological Review*, Vol. VI, 1899, p. 345.

rise much above those of preceding days, the number of low throws continually decreased. The lowest throws are more frequently the result of accidental conditions than the highest. While the latter is always above the learner's usual ability at a given time, it none the less shows the direction in which he is moving, and its height on any day bears some relation to his rate of progress. That is to say, though the learner may not on the following day reach the level of the highest throw of the preceding day, he will shortly attain it and make it, in turn, the basis for further advance.

Some Conditions that Influence the Learning Process in Ball-Tossing.—It has already been mentioned that efficiency is greatly affected by physical condition. It is well known that physical experts of all sorts must keep themselves in condition, else they will drop into the class of inferior men. The influence of this factor was evident in all of the subjects. One subject, not represented in the curves, who made the exceptionally high score of 2,155 catches in ten series during the April holidays, had taken a long walk into the country on the morning of that day. On the following day, when his score dropped to 1,359, he had been working at his desk all the morning and did not feel fresh. Every catch required greater effort.

Sometimes the lowered vitality is not apparent to the individual himself. G, who threw three balls with two hands, made a score of 730 catches on his fifth day, and when he began on the sixth felt confident that he would make his first thousand. But, instead of this, he fell to 431. After starting, he found that he could not control his muscles. What had been easy the day before was now done only with the greatest effort, and

at the conclusion of the day's trial he was in an uncontrollable tremble.

Probably the "off days" that all subjects had belong here. These differed from the days when they were simply unable to reach the high score of the previous day. Sometimes they felt no confidence in their power to do any sort of good work, though they could give no reason for the feeling. At times "warming up" freed them from this feeling, but again even the lower scores required much greater effort, amounting in some cases to an exhausting strain.

The correctness of the curves obviously depends upon the uniformity of the effort put forth by the subjects. It is commonly assumed that the maximum effort is a constant factor for a given individual, and that the only thing needed to secure it in a conscientious subject is to interest him in the work and then ask him to do his best. While I have no reason to doubt the conscientious effort of my subjects and the practical uniformity of the average effort of each from week to week, the matter is perhaps of sufficient general importance to the precision of psychological experiments to justify a brief discussion of it. Even a direct interest in the results of an investigation, aided by the no less effective acquired interest aroused by the professional advantage from a well-worked-out problem, will not enable the experimenter himself to make a steady maximum effort.

In the ball-tossing the influence of this element was less noticeable on account of the use of the voluntary muscles and because of the counter-effect of the subjects watching their own progress and of competing with others. But even here unintentional relaxation became evident now and then by comparison with the

intense effort put into the work at other times, as, for example, in the last half when the score of the first half was found lower than the subject had hoped for. Anderson also found[1] that in strength tests every man but two "failed to equal his best record when tested apart from the other members of the class," and Johnson observed[2] the same thing in tapping experiments. Yet it is easier to hold ourselves to steady intense effort in feats of muscular skill and strength than in many other activities, because of our mastery of the voluntary muscles.

This lack of energy, due to waning interest, probably has much to do with delaying the learner's progress and increasing the length of "plateaus." One cannot escape a dead level in uninteresting work, and after the enthusiasm that novelty stirs has spent itself the interest is dulled and effort slackens.

But the slow progress is frequently only an apparent one, due to our inability to measure the advance. It is a case in which figures tell only a part of the truth. In these experiments, when the curve showed little or no rise, it was evident both to the subjects and to the experimenter that they were still making progress, and the proof of it, aside from unmeasurable observation, was the occasional high throws. In such cases the curve remained stationary because the imperfect training had not enabled the subject to meet the chance emergencies that were constantly arising.

But the matter of interest is still more complicated. In ball-tossing, after one has reached a fair degree of proficiency, the first part of each series is always some-

[1] *American Physical Education Review*, Vol. IV, 1899, p. 265.
[2] W. S. Johnson: *Studies from the Yale Psychological Laboratory*, Vol. X, 1902, p. 81.

thing of a bore till the fifty mark is passed, when it becomes interesting. Later, the interest may take another slump, rising again after the score has reached one hundred. At this point the possibility of an unusually high score keeps the subject alert to the end. There was also a plateau in the interest of some of the men, after throwing, for the first time, a hundred in a single trial, for which they had been very keen. They felt that it was impossible to reach the two hundred mark at once, and the total thousand was too far off to be alluring, so the edge of their enthusiasm was turned. Later, when the chance to make another record seemed good, they became as alert as ever. Indeed, after the satisfaction of having thrown a hundred had subsided, and the work continued for a time without great progress, the first twenty-five took on an acquired interest in the anxiety to finish the work. This brought greater care.

The confidence that follows a successful series of throws proved of considerable value, unless it led to the carelessness of over-confidence. Faith in one's ability to get out of a desperate situation in the tossing increases with success. This leaves the attention imperturbed, and one does not "go to pieces."

A long period of delay often represents the physiological limit with a particular method of tossing, and a rise is made only by the introduction of an improved mode of procedure. This was especially noticeable in C, who caught at first with the hand high in the air and the palm forward and almost perpendicular. This high catching seemed to be a sub-conscious accommodation to the position for throwing. The balls, of course, glided down his hand before he could seize them, and

he made practically no advance until he held his hand lower with the palm turned upward. This improvement, which necessitated the further change of keeping the balls at a distance from his body, was consciously adopted on the thirty-third day, and at that time a new rise began. The general flatness of C's curve is doubtless due to the fact that he never played ball when a boy.

F, on the other hand, on the third or fourth day, found himself tossing the balls up at nearly arm's length to the right, and in such a way that they took a circular course and came down in front of his body. In this way collisions were avoided. The plan entered upon unconsciously was then consciously adopted, and as a result of finding a successful plan early in the work, his progress was rapid and his curve is the most regular of all. It may probably be regarded as typical for muscular feats in which there is no long-continued feeling around for a successful way of doing the thing, as when the learner is assisted by a good teacher.

One of the subjects, not shown in the curves, tried pretty constantly not to adopt consciously any method, but to let everything take its natural course, and as a result his progress was slow but steady, without any high jump until near the end. His efforts in this direction did not, however, prevent his final approximation to a regular method, though one less advantageous than that developed by F.

We see in this the value of suggesting good ways of doing things while the learning is still in its early stages. If the learner goes on he will finally develop a plan of his own, but only after a good deal of wandering, and even then it may not be the best. But the suggestion to

be effective should be given at the time when need for it is keenest, at the "psychological moment." It is then that its value will be felt.[1]

In polo, golf, baseball, or football, "good form" is absolutely necessary for reaching a high degree of skill. It is the essential prerequisite for a good method. Movement and position become associated, and a change in the latter requires relearning the former. The physiological limit of bad form is low.

In learning any complicated performance, we progress by sections. That is to say, the coöperating movements improve separately. This leaves certain errors conspicuous when we are well along in the work. Indeed, the whole learning process seems to consist in eliminating errors. First the obvious ones are disposed of, then new ones appear, and it is only after all have been overcome that the act can be regarded as mastered.

In avoiding errors there was adaptation, apparently more subconscious than conscious, to conditions, and often it was so delicate as to elude observation. One of the subjects, for example, found himself tossing high in order to have time to recover from a difficult situation, and at another time he caught himself putting his body into a more alert position by slightly raising himself on his toes and making his muscles tense. Then he realized that he had been doing this for several days. So far as he could determine consciousness had no originating part in it.

It is interesting that all the subjects improved by hitting upon better ways of working without any

[1] Miss Shinn reports that her niece until six years old always ran flat-footed, but when she was shown the advantage of keeping her heel slightly lifted, she readily adopted it.

further conscious selection, at first, than the general effort to succeed. There seems to be a competition of methods. Just how this selection occurs without conscious interference is not easy to say. Consciousness discovers modes of action already in use, and selects some of them for survival because of their success. They then pass into the automatic. In this way reflex movements may have first been conscious.

Two learned to throw in less than half the time that the others needed, but their movements always called for a great outlay of energy. Economy of effort is an important element in effectiveness, but its acquisition requires time for the solidification of associations and for the elimination of useless movements, with the subsequent automatization of just those which are essential to the process.

A certain amount of "warming up" was usually necessary. While high throws were not confined to one part of the day's test, they rarely came at the beginning. Commonly, so long as the score was low enough to eliminate the effect of fatigue, the one or two high throws, after the warming-up period, were followed by a slump, which again yielded to high ones toward the end. This form of the daily curve was too common to be entirely a matter of chance. It is another case of the uncontrollable variation of the maximum effort. Johnson,[1] in his experiments on Practice and Habit, also noticed that his subjects could not get control of their muscles within the time of the preliminary tests.

Bryan and Harter believe that it is intense effort which counts, and this is true, but with a qualification.

[1] *Loc cit.*

Throughout this investigation it was clear that attempts to spurt were not effective. Indeed, the very effort interfered with success by making the attention too obtrusive. Special strain is itself a distraction, as Johnson found at times. It is steady and calm intensity that makes for progress. The importance of strenuous effort lies in the fact that up to a certain point of intensity it is generally *successful* effort, and that is what counts, as Woodworth [1] and Johnson found.

Fatigue from any cause not only brings a lowering of the day's score, but the entire process of learning is probably hindered. The growth of the nervous system into the required forms of activity has been disturbed. F felt that he was delaying his left-hand progress by practicing when fatigued from lectures, and a change of hour brought immediate results.

In tossing and catching the ball a pretty general cooperation of all the muscles of the body is required, though those, of course, that cause the movements of the arm and hand are most directly involved. Of these the movements most prominent in consciousness are the general movements of the arm. The body movements, in most cases, do not come into consciousness at all, and the finer movements of the fingers and hands, except so far as they are covered by the general intention to toss and catch the ball successfully, are almost equally disregarded. As a matter of fact, however, skill in throwing and catching is rather more an affair of the fingers than of any other members.

The question then arises, How are the necessary coordinations brought about? It does not seem difficult to bring the matter into line with phenomena already

[1] *Psychological Review*, Supplement, No. 13, 1899.

pretty well known. Let us suppose a successful toss and catch are made. This is followed by a double effect; it leaves, as every action does, a trace in the nervous system which facilitates later repetition of the same action, and the successful adaptation also gives rise to a feeling of pleasure. The effect of pleasurable sensation is a heightening of muscular tonicity or a general tendency to motor discharge, which in the case of an action just performed—one whose neural effects are still lingering—is equivalent to a partial reinnervation of the same coördinated group of muscles, which again deepens the existing trace. The next actual effort finds the nervous mechanism a little readier to react in this favorable way. In case of an effort that does not lead to success, the slight displeasure at failure exerts its natural depressant effect upon the whole neuro-muscular system, and this does not deepen the neural trace left by the original movement, and even, perhaps, breaks up the incipient coördinations that gave it its particular form. In any case, whatever its mode of action, it has not the reinvigorating effect upon the original neural trace exercised by the pleasurable sensation. In the long run, therefore, the successful movements, and the coördinations upon which they depend, tend to persist, while those that are unsuccessful tend to fall away.

Now it will be observed that this action of pleasant and unpleasant sensation does not depend at all on consciousness of the detail of the movements, and applies as well to a movement of which all the ultimate factors are subconscious and only the general end known. In such a movement, if the result is unsuccessful, a slightly different movement follows at the next trial,

that is, one in which the coördination among the muscles engaged is slightly altered, as an automatic result of the partial inhibition of ill-success. This new trial may be no better than the previous one, in which case it is again altered until success is reached or the attempt given up completely. In the case of movements, the details of which come more or less completely into consciousness, the same process goes on, but with more rapid progress toward the desired end, because the variations from which the advantageous movements are selected are not chance variations, but are from the start more or less perfectly suited to the requirements of the case. In the ball-throwing the general arm movements remain the prominent thing in consciousness, as we have said, while the finger movements are little noticed or quite neglected, and yet, nevertheless, the whole coördinated group is worked over, under the influence of the voluntary movements, into proper adaptation for the successful performance of the feat.

2. *The Effect of Right-Hand Training upon the Skill of the Left Hand.*—The subjects in this investigation were all tested with their left hand, as already described, before the right-hand practice began, in order that the effect of right-hand practice upon the facility of the left hand might be determined. The results of the left-hand tests before practice with the right hand are shown by the small circle on the vertical line to the left of the curves. The progress of the left hand in its subsequent practice is shown upon the same scale and in the same way as that of the right hand.

Several things are at once noticeable.

1. The record of the first day of regular left-hand training is in all cases higher than the preliminary test,

though in no case had the left hand been practiced with the balls during the interval. More than this, the score never drops to the level of this preliminary test, which shows that the gain was permanent.

2. The left-hand curves bear a striking resemblance in general form to the corresponding right-hand ones, with this difference that in all but one case they ascend much more rapidly. A did in eight days with his left hand what his right hand needed thirty-eight days to accomplish. E made a left-hand record in four days that he had not been able to do in less than eleven days with his right. The difference with the others is not so marked, but in all ca[redacted]the left-hand curve rises more rapidly than the ri[redacted]

3. All of the subjects made a better score with their left hand on the first day of its regular practice than they had been able to do with their right at the beginning of the work.

F was delayed in his left-hand progress at about the middle of the work by physical and mental exhaustion.

The conclusion is unavoidable that in the majority of cases the training of the right hand was somehow effective upon the left also. The same general result has been noticed by many observers engaged in different lines of investigation. The chief point of interest is to discover how the effect is produced. Is it due to some purely peripheral change, or to some alteration in the central nervous system, or, finally, to some method or plan of work that may be applied equally well in the case of either hand, as, for example, the knowledge of spelling which a man could use as well in writing in mirror script as in the ordinary way? It is not impossible that cases could be found that

would exhibit the coöperation of all three. In the ball-tossing there was evidence, certainly, of the last two. All the subjects were able to make use with the left hand of the methods of handling the balls, and of recovering control of them after an ill-directed throw, which had been developed in the right-hand practice. In all the cases but one a good deal of a less conscious facility (of a sort that might indicate some kind of symmetrical training of the central nervous system) was probably present. The subjects were able at once to build in the sub-structure of central (or neuro-muscular) skill, and so to learn the art of left-hand throwing much more quickly than the right. The mental element, the power to comprehend and meet a situation, is evidently, then, in most cases, the more difficult part of the complex muscular feats of skill, since the right hand, if taken first, needs so much more time for the learning than the left, notwithstanding its greater general facility in such movements in right-handed people.

It seemed important, in this connection, to test the relative skill of the right and left hands of the several subjects in another manner, and for this purpose a target, approximately seven feet six inches in diameter, with nine concentric circles each about four and a half inches wide, was used. The test consisted in throwing one hundred balls with each hand from a distance of thirty feet. The bull's-eye was nine inches in diameter, and the balls used were such as have been described above. The following shows the success of the left hand compared with the right in percentages. C=45 per cent., F=66 per cent., while A and E each gave 72 per cent. If now we consider the skill of the right

hand, merely, estimating it by success in throwing at the target, we have the following order, beginning with the best, F, E, C and A. Again, arranging the subjects in the order of their left-hand skill, leaving the right hand out of consideration, we have, beginning as before with the best, E, F, A and C.

To return, now, to the subject of left-hand training, it would be a mistake to suppose that such experiments in cross-education give support to the doctrine of "formal education." There is no evidence to show that training has general value. Indeed, it all argues strongly for the influence of content. Volkmann[1] found that six months of regular practice in distinguishing small visual distances [redacted] which his eyes gained remarkable power, had no effect whatever on his ability to perceive small tactual differences. The right hand has had a great variety of training that ought to bring it along rapidly in ball-tossing on the principle of formal training, but this investigation shows just the reverse. The right hand learns it very slowly, but the special training that comes from doing a specific thing, enables the left hand, awkward and stiff as it is, to get control of the situation in about one-third of the time required by the right. Skill in certain lines may be serviceable in other similar processes, but its value decreases as the difference between the kinds of work increases, and in many cases it is probably reduced to zero.[2]

[1] A. W. Volkmann: "Über den Einfluss der Übung auf das Erkennen räumlicher Distanzen. Berichte über die Verhandl. d. k. Sächs. Gesellschaft d. Wissenschaften zu Leipzig," Math.-Phys. Classe, Vol. X, 1858, p. 38.

[2] R. S. Woodworth and E. L. Thorndike: "The Influence of Improvement in one Mental Function upon the Efficiency of other Functions," *Psychological Review*, Vol. VIII, 1901, pp. 247, 384 and 553.

II.—TYPEWRITING

Method and Conditions.—One hour each day was given to the test, and this testing, again, formed the sole practice of the subject. The number of words written during the hour was recorded, and from these daily records the curve of this learning process was drawn. The subject—the writer—kept track of his daily progress, and this doubtless acted as a continual incentive to renewed effort. The writing was from copy, and at each test effort was continually made to maintain the maximum speed. The hour for work was in the afternoon. In a few instances university duties made a change of time necessary, but such variation in the regular programme was always recorded and its possible effect upon the curve was considered. My physical condition, also, was carefully noted each day. Unforeseen duties, coming immediately after the first day's practice, interrupted the work for the four following days, but during the remainder of the investigation there were only two interruptions, *i. e.*, on the sixteenth and thirty-first days. These two interruptions were caused by indisposition.

The typewriter used was a Smith-Premier No. 4. I had never used any kind of typewriter except to finger out slowly about a dozen short business letters two years before. It is doubtful if the number of words in all these letters exceeded five hundred.

Preliminary Statement.—The number of words written during the hour is shown on the vertical axis and the days are on the horizontal.

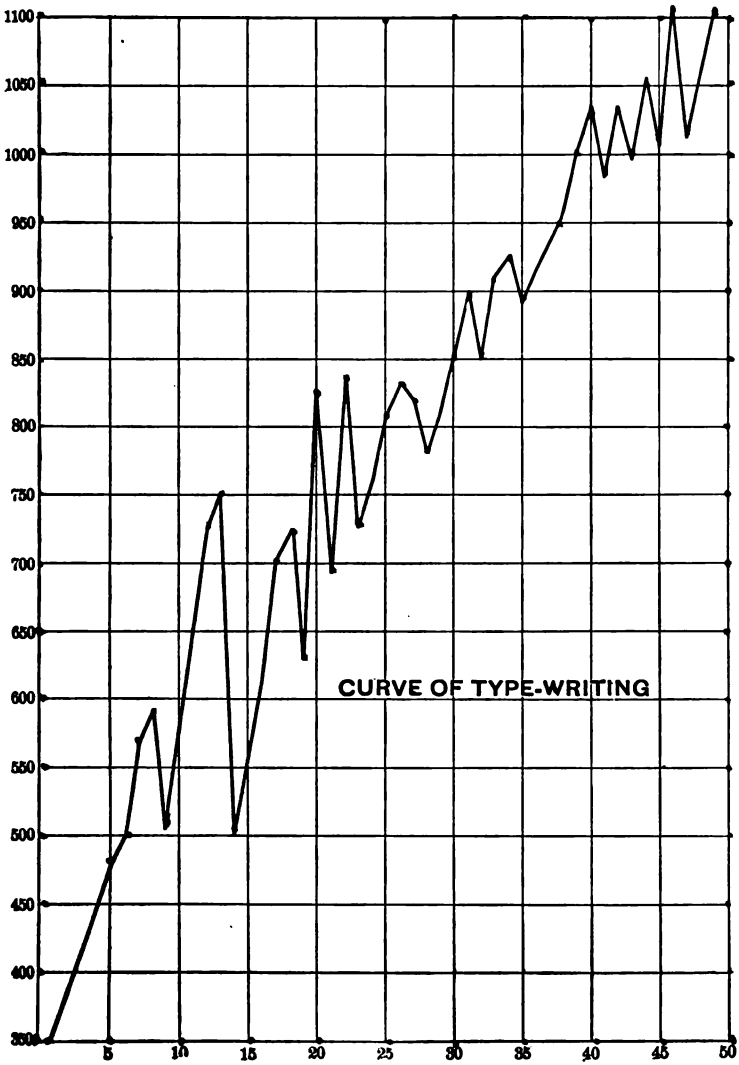
On account of the variation in the length of words it

seemed best to control this possible source of error by also recording the number and parts of lines written during the hour. This was begun on the twenty-third day and continued without interruption until the end of the investigation. The resulting curve differed so little, however, from the one given below that its reproduction here would be useless. The general course and form of the curve were unaltered.

At the close of each hour's test a record was made of any facts that had a bearing on the curve. Typewriting is particularly adapted to introspection, as one is able to catch some of the fleeting processes that often escape detection when doing other things. These introspections were also carefully noted at the time.

Description of the Curve and Discussion of its Form. —The initial rise was clearly due to the ease with which a few imperfect coördinations and associations are learned, and to their effectiveness at this early stage. This rise is rapid in typewriting, because one quickly learns to locate letters on the keyboard with some degree of facility.

The long drop on the fourteenth day was due, in large part at any rate, to harder "copy." Up to that time I had copied long personal letters, but on the fourteenth day the work changed to lectures on the history of education. The average length of the words was much greater, and there were fewer of the short words frequent in letters, which had come to be written with considerable ease. As the curve for this period shows, seven days were required to excel the highest record reached with personal letters. That the greater difficulty of "copy" was the cause of the drop was evident not merely from the immeasurable "feel-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CURVE OF TYPE-WRITING

ing" of greater effort with lessened result, but also from actual comparison of the two sorts of material. In one respect it is unfortunate that a change was made, since it breaks the continuity of the curve. But for the change the curve would probably have continued an upward serrate course. From another point of view, however, it is fortunate, since this unevenness of assigned subject-matter often occurs in the class-room.

The same irregularity from day to day that was noticed in tossing balls is apparent here. Retardation alternates with progress. In many instances no reason could be found for the drop. The record for the ninth day illustrates this. The notes for the day read, "The material was no harder than usual and I was in excellent condition." It is interesting to observe that on the same day I seemed to be doing as well as at any previous time. The only day when the low record could be accounted for by lowered physical vitality was the forty-eighth day.

The period of enjoyment of the work coincided with the first rapid rise. The work was new and progress continuous. The mental depression caused by monotony and the first drop in the curve began about the same time. In the experiments on ball-tossing the same *ennui* was observed, and, at that time, it was thought to be an important factor in making or prolonging plateaus. The same feeling during arrest of progress here sustains this view, though the greater difficulty of this work may be an additional element in the retardation.

III.—BEGINNING A LANGUAGE

In selecting the language for this phase of the investigation it was important to find one in which the

learner's previous studies would be of least assistance. The Romance languages were, of course, excluded on account of their similarity to Latin. The choice finally fell upon Russian, because, while meeting the other requirements of an investigation, there are two fairly good beginners' books.

The investigation was begun March 30, 1905, and ended June 14th. The experiment consisted of thirty minutes' study immediately followed by a fifteen minutes' test of reading ability. The daily preliminary study of thirty minutes was carried on in a perfectly natural way, the time being divided between the vocabulary of the lesson to be read in the test which was to follow, conjugations, declensions, and practice in reading review exercises, as the needs of the day suggested.

In the investigations in the psychology of learning which we have discussed above, the subjects exerted themselves to their utmost to make a record, but this time, though every moment was utilized, there was no attempt to "spurt." The work in both the study and the test was done without strain, and for that reason the result is more nearly comparable with that of the school.

The curve is based on the number of words read during the daily fifteen minutes' test.

Certain rules of procedure were necessary, and the following were decided upon at the beginning, and strictly adhered to throughout the investigation.

1. Proper names were not included in the count.

2. When the same word was immediately repeated, so that the knowledge was directly carried from one to the other, the word was counted only once.

3. When an intelligible meaning could not be found for a sentence, the words were not counted.

4. If, at the close of the test, a sentence was left unfinished, only those words were counted whose significance was clear in connection with the meaning of the sentence to that point.

5. During the test the vocabulary of the lesson was covered with paper and not referred to until the attempt had been made to find the word in the general vocabulary at the end of the book, and also in the vocabulary of the reader. If the word was not found in either of these places, it was then sought in the vocabulary of the exercises for the day.

The work of the investigation was the first thing undertaken in the morning. The subject (the writer) after reaching his office spent fifteen minutes looking over the morning paper so as to "cool off" mentally after the half-hour's walk from his home. The same routine of daily life was carefully maintained throughout the investigation so as not to complicate conditions. Immediately after the test was finished the work was thought over, and any points that bore upon the investigation were noted. The particular lesson and sentences entering into the test of the day were also recorded in order that their ease or difficulty might later be considered in interpreting the curve.

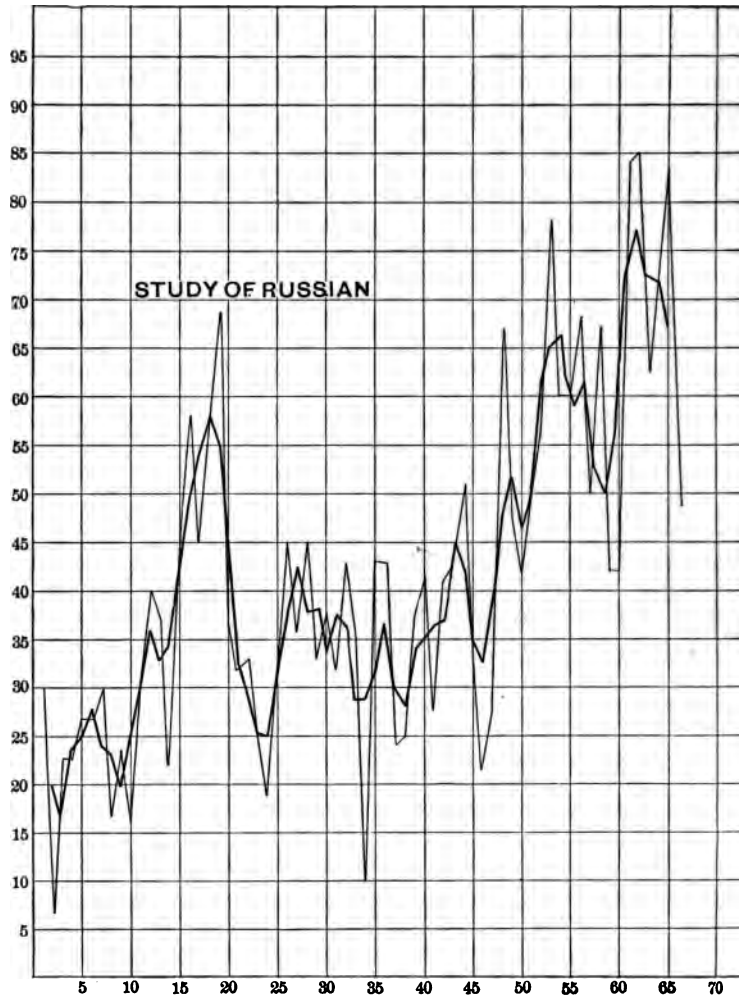
The books used were Mott's *Elementary Russian Grammar* and Werkhaupt and Roller's *Russian Reader*. The exercise sentences of the grammar were taken in order first, and when they were completed the reader was begun. There was no skipping, except that when a sentence was not finished in the test of one day, the test of the following day commenced with the next

sentence. The grammar work kept pace with the exercises to be read. As the exercise sentences were not numerous enough to call for more than one or two days on a single lesson, the forms could not always be thoroughly committed to memory. This was particularly true of the verbs. The writer suspects, however, that this is not very different from the condition of the average school-boy when he goes to his recitation.

The test was made daily, with the exception of Sundays, and the condition of the subject was always carefully noted.

I had never before looked into a Russian book and knew absolutely nothing about the language. As a preliminary preparation for the investigation two hours were spent in studying the alphabet. This time was distributed over four days, one half hour on each of these days being given to it. At the end of these four days the investigation took the form that has been described, one half hour of study followed by fifteen minutes of test. Aside from the two hours' study of the alphabet, the daily half hour of study was all the time that was ever given to the language, excepting, of course, the fifteen minutes' test, until after the completion of the investigation. Only twice was help obtained, and then only in learning the meaning of two words whose irregularity made it impossible to find them in the vocabulary, and which were causing confusion by their frequent occurrence.

The following curve was traced from the number of words translated each day during the fifteen minutes' test. The days are indicated on the horizontal base line, and the number of words read on successive days appears on the vertical line at the left.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Description of the Curve and Discussion of its Form.—The high record of the first day indicates a certain control of letters, and marks the rise from zero knowledge. The lesson for this day consisted merely of words in the nominative case, which were found without delay, and two or three sentences so short and easy that the translation required no time when once the meaning of the words was known.

On the second day noun cases entered into the work, and for this reason the words were not so readily found. A few of the real difficulties of the language for which knowledge of symbols was inadequate were now for the first time encountered, and so the score dropped.

It will be seen from the curve that six days were needed to equal the record of the first day, and even then this level was not held. Indeed, even on the forty-sixth day, as the curve shows, the score dropped to twenty-two words, while on the thirty-fourth day only ten words were read. The reason for this low record appears from the notes for that day: "New words and obscure expressions prevented progress."

In interpreting the significance of the great variations in the curve, the sudden rises followed by an equally sudden drop, it must be remembered that I was handling a tool about which I knew very little. If the declension of the words in the exercises was regular, the work was likely to go smoothly, and the resulting score would be high. But if a case-form so irregular as not to be readily recognized appeared, the delay might be so great as to reduce markedly the score for that day. In such a case, however, the learner's knowledge would not be fairly represented by the day's record. This shows his deficiency rather than his

power. Ordinarily, even at that stage of progress, he would do better, as the subsequent, and in many cases also the previous, score shows. But as yet he cannot be depended upon in an emergency. His knowledge is still limited in quantity and superficial in quality. I was conscious of this, and it was not until about the fifty-third day that a feeling of moderate confidence arose. The notes for that day say, among other things, "the difficulties seem to be settling somewhat, but words are still hard to remember."

The phenomenal rise on the sixteenth and nineteenth days seems to have been due, in part, to easier translation material. The sentences for those days were respectively illustrative of the interrogative and negative forms of regular verbs and of demonstrative pronouns. The time for advance had probably come, but the rise was too great to be ascribed solely to the proficiency acquired. Thirty-four days of study were needed before that height was reached again, and to the end of the investigation it was not permanently held. All of these noticeably high records that were not made again for some days, indicate that the learner had temporarily overshot his permanent power, and, as will be shown later, time was needed to perfect the automatization. The same fact was observed in the investigation of ball-tossing and of typewriting.

New words, not given in the vocabulary, and obscure expressions, caused the exceptionally low record of the thirty-fourth day.

The rate of measurable progress at the beginning was much slower than in learning typewriting. This is seen in the length of time that passed before a much higher level than that reached during the first few days

was permanently gained. The ascent is not so sudden nor so continuous as in typewriting, and for that reason the curve is more nearly of the concave type. The reason for this is that in typewriting all the symbols were partially learned at the start, and the remainder of the time was given to automatizing this knowledge. In Russian, however, each day added new words and new grammatical forms. Then, too, since the test-exercises for a given day dealt especially with the subject-matter of the lesson, what had been learned in the past did not count greatly toward the translation. The grammar work, with its test sentences, was finished, and the reader begun, on the forty-third day, and from that time the rise was less interrupted.

The general form of the curve will be more clearly seen in the smoothed curve marked by the heavy line.

Discussion of the Results in the Light of Introspective Notes.—It will be seen from the curve that there are three periods of manifest advance, and four "plateaus," the last plateau coming at the end of the investigation. Since plateaus seem to indicate that the learner is making no progress, their real significance is a matter of considerable interest. In this investigation, as in the experiments on ball-tossing and typewriting, "higher-order" habits made their appearance early in the work. At first they were fugitive and not easily detected, but very soon one or two became sufficiently permanent to be clearly observed. It was noticeable, however, that extreme sensitiveness to conditions marked even this latter stage. A slight fatigue, or any mental disturbance whatever, drove them away, and the subject at once sank to the level of "lower-order" habits. It would seem from this investigation, as well

as from those which we have just discussed, that the difference between earlier and later stages of the learning process does not consist in the absence, in the former, of "higher-order" habits acquired only after those of the "lower order" have become automatic, but rather in the predominance of "lower-order" habits during the earlier stages of the work and the gradual self-assertion of those of a "higher order." Both kinds of habits were in process of formation almost from the beginning, and, as the investigation ended before any great proficiency in the language had been acquired, both were conspicuous to the close. Introspection made it clear, however, that very early in the work, perhaps on the second or third day, a few common words of two, and possibly, in a few instances, of three letters were recognized at sight, while all others had to be slowly pronounced before they could be recognized, and that, too, regardless of the number of times they had already been seen. As the ability to recognize words at sight is a "higher-order" habit, at least when compared with the need for slow and labored pronunciation, it will be interesting to trace its growth. On the sixth day the notes read, "with the exception of common words of two and, in a very few instances, three letters, no word, however many times it may have appeared, is recognized until orally or mentally pronounced." Again, the notes for the next day say that "in two or three instances words previously requiring pronouncing were recognized at sight." By the ninth day this power had increased so that "two or three reasonably long words were recognized at sight." Among them were the verb meaning "to speak," and the noun for "boy." The following day this list was

increased by the words signifying "to play," "cat," and "with." Still, notwithstanding the early appearance, and, at the outset at least, the seemingly rapid growth of this power, throughout the entire investigation words that had appeared many times, and, on occasions, had been recognized at sight, would require pronouncing, and even then, in many instances, the meaning would not come. Again, visualization of words, also one of the "higher-order" habits, was observed on the fourth day. "To-day for the first time," the notes say, "I was able to get the faintest suggestion of a visual image of two or three words that I was learning to decline." The increase of this power, while exasperatingly slow, was nevertheless noticeable. The fact that the writer is, in general, a poor visualizer naturally retarded the growth of this power.

The curve would seem to indicate that during the plateau periods no progress is being made, but careful observation of himself, in this investigation, and of pupils and students at their work, has convinced the writer that there is unquestionable progress at this time, only it is of such a nature that it cannot be measured, and so does not reveal itself in the curve. What is going on during these periods of apparent arrest is important in the psychology of learning and an eminently practical question for education. The cue for the interpretation seems to be given by the periods that are dominated by the feeling of mental confusion. These, in general, correspond to the plateaus of the curve. New factors in the study accumulated too rapidly for immediate assimilation. Until they had become reasonably automatic, visible progress was impossible. On the twenty-first day, for example, just

at the beginning of the long plateau, I find in my notes that "a more or less ill-defined mass seems to be settling down upon me. It looks as though time were needed for this turgid fluid to settle." It is a mistake, though, to assume that the learner is making no progress during this time. He is getting knowledge, and it is gradually assuming a more orderly arrangement; but it cannot affect the curve, except at irregular intervals, until it has acquired a certain effective force. The leap forward indicates that the automatization has improved and the power needed for further advance has been gained. Sometimes this becomes evident to the learner before the advance is made, as on the forty-seventh day, at the end of the long plateau of which we have been speaking, when I wrote, "I have a feeling that my score will jump soon."

Closely connected with the fact that the automatization of so-called "higher-order" habits is contemporaneous with that of the "lower order" is the observation that the progress of an automatization once started is not continuous. The mind matures irregularly. It has long been known that in children interests follow one another because of the difference in the time of the attainment of functional maturity by the several parts of the brain. Probably this is only one phase of the more extensive principle that the acquisition of power, like the growth of the mind in general, is always by sections. The underlying reason is physiological. Where it is not a matter of actual brain growth it is one of structural organization—the opening of new paths of nervous discharge and their habituation to automatic functioning. In the investigation of typewriting this irregularity was observed in the growth of word-asso-

ciations and of position-associations (location of the keys by muscular sense), and in this investigation it was seen in the variation of the power to recognize words without pronouncing them, in the ability to visualize words, and in the knowledge of different classes of words. At times it seemed as though no progress were being made in one form of automatization, while in another the advance was by strides.

As in single automatizations, so also in the general forward movement, progress is never steady, but always by leaps, preceded by longer or shorter periods of apparent cessation of progress. There is a gradual but irregular growth in the intelligibility of the subject-matter in hand, while interspersed within the period of general advance are days when uncertainty and confusion dominate. When in the latter condition, the learner feels that the whole thing is hopeless. A few sentences taken from the notes of successive days will illustrate this. On the sixteenth day they say, "The language seems to have taken on somewhat more intelligibility"; but the following day I "did not experience the same ease as was felt yesterday." The next day "things went quite easily," and this same feeling of ease continued through the nineteenth day; on the twentieth, however, "the difficulties were numerous," and the following day saw no improvement. It will be noticed by referring to the curve that this is about the beginning of the long plateau, and the notes, in each instance written immediately after the test to which they refer, also indicate a period of apparent arrest of progress. On the twenty-second day, the next in order, this becomes still more evident. The notes now run: "Words and forms have been accu-

mulating so rapidly lately that the feeling of confusion which seemed to be disappearing a few days ago has returned. It is the old chaotic feeling that characterized the early part of the work. Still, it is not quite so overwhelming as it was at that time." Again, on the following day, "everything is chaotic." By the twenty-seventh day, however, "the confusion is less disturbing. The elements of the language are taking on a little order." But the change was only temporary, as the notes do not indicate any permanence in the improvement until the forty-second day, when "things seemed to go pretty well." From this time the notes give evidence of an increasing feeling of certainty, as on the fifty-third day, when, as the notes say, "the difficulties are becoming somewhat differentiated and less confusing," and on the sixty-fourth, when "the translating begins to seem a little more natural."

In the experiments on ball-tossing and typewriting, monotony was found to be an important factor in the rapidity with which skill was acquired, and the same condition was observed in this work. Periods of monotony alternated with periods of pleasure in the work, and, at times, of keen enthusiasm. While, as has been said, it is not probable that the depression associated with the monotony caused the plateaus, it seems quite reasonable that it prolonged them. Generally, though not always, this feeling of discouragement corresponded with the plateaus of the curve, and it is an interesting fact that returning pleasure and confidence sometimes prophesied a new advance.

Conclusions.—It is the common factors of these several types of learning that are of chief importance for present consideration.

The effect of the physical condition should, perhaps, be mentioned first, because the complex nature of many learning processes makes the detection of its influence exceedingly difficult. The strictly mental subjects of study conceal its effect, because of the difficulty of isolating it from the many possible sources of disturbance, amid the perplexities of the subject-matter and the conditions of work. For several weeks a child has not been keeping up to his former standard. Is his failure due to some physical disturbance, or to his inattention in class, or neglect of study, or deficiency in the elements of knowledge upon which the work of the last weeks depends? It is difficult in many cases, if not impossible, to determine. But in acquiring proficiency in a physical act of skill, where the learners are old enough to eliminate inattention so far as volition can do it, and where they are profoundly interested in the outcome of the work and have already acquired a degree of skill that bars out deficiency in the elements as a possible factor in their failure, the effect of physical condition on their progress is more easily discerned. The experiments in ball-tossing satisfy these conditions, and the influence of the physical tone was frequently observed by all of the participants. That the effect of this factor, however, is not limited to one type of learning is shown by the conspicuous examples cited in the preceding pages. One of the first results of lowered physical tone has long been known to be loss of nervous control over the small muscles. As success in keeping two balls in the air with one hand depends chiefly upon the delicacy of small movements, it becomes an unusually sensitive measurer of the subject's physical state. In typewriting it was the newly forming group-associations

that first showed the effect of the fatigue. The learner was reduced to the condition with which he started, *i. e.*, writing letter by letter. Word-associations which enabled him to strike the letters of a word without being conscious of them singly, and position-association by which he "felt" the location of the keys without seeing them, were in complete abeyance. Under similar conditions a child who, in learning to read, has advanced so far as to recognize words at sight without spelling them would be reduced to the spelling stage. When we remember that it is the latest acquisitions, those that mean most for the learner's progress, which first feel the effect of lowered physical tone, the significance of the problem for education and brain improvement becomes apparent.

Progress in learning, as we have seen, is never continuous. It is a gradual and irregular growth from a condition of mental uncertainty and confusion to one of automatic certainty. The learner always advances by jumps. For a time there seems to be no progress. This condition may continue only a few days, or it may last several weeks. Both teachers and pupils are discouraged because they do not understand that this is one of the characteristics of the learning process. Suddenly, and sometimes without premonition, the difficulties clear, and the learner leaps forward. Frequently he jumps a little farther than his present powers justify, and then he falls back again; but if so, it is only for a short time. The sudden advance is the precursor of the general forward movement that is to follow.

The periods of no-progress occupy by far the greater part of the learning process. Advances are momentary, and then there is likely to be another delay. When a

curve of learning is traced these periods of arrest are seen as "plateaus," and since they are the most conspicuous part of the curve their significance for education becomes an exceedingly practical question. Bryan and Harter are of the opinion that "a plateau in the curve means that the 'lower-order' habits are approaching their maximum development, but are not yet sufficiently automatic to leave the attention free to attack the 'higher-order' habits," and that "the length of the plateau is a measure of the difficulty of making the 'lower-order' habits sufficiently automatic." [1] All of the investigations of the writer have sustained his first conclusion that there is no separation of "lower" and "higher order" habits into different periods. Both sorts of habits are present very early in the work, and the automatization of both is going on all the time. The difference between the early part of the work and any subsequent period is rather in the prominence of one or the other class of habits. Naturally the learner begins with the lowest order of habits. He is dealing with the elements of the subject-matter, and he handles them in isolation, in a purely mechanical way. In a very few days, however, some of the simpler instances of "higher-order" habits are discerned, and from that time they become increasingly prominent in the work. It is a gradual growth from a state when "lower-order" habits predominate to a condition of predominant "higher-order" habits by which the mind deals with elements in groups as symbols of ideas instead of in detail as elements of the group. In typewriting, for example, word and location-associations were detected early in the work, gradually replacing those of

[1] *Psychological Review*, Vol. VI, 1897, p. 345.

letter and sight. What, then, is the significance of plateaus? Considered from the point of view of visible progress they are resting places, but from the side of automatization of associations they are most active periods. The learner has reached the limit of his present power and must wait until automatization is perfected. As will be shown later, they may be prolonged by a slump in enthusiasm. Monotony is likely to overcome the learner. After improvement in automatization the learner is able to do better and takes courage. Enthusiasm to advance, now that it is easier, overcomes the irksomeness.

Educationally, plateaus have great significance. They are the mind's protest against further cramming, and instead of trying to hurry pupils over them, as teachers are prone to do, they should be recognized as essential to the learning process. But, while plateaus are evidently a distinctive feature of the learning process, it is no less certain that they are unnecessarily increased in number and depressingly prolonged by the rapidity and looseness with which previous work has been gone over. The shakiness of the foundation work is the cause not only of many of the plateaus but also of the failure of studies to take such a hold of pupils that work in them ceases to be a grind. The method which should be followed during these periods of retardation becomes evident from an analysis of their nature. The subject-matter should be reconstructed and reorganized, so that the automatization may not be too mechanical and stereotyped. But in it all the purpose must continually be in mind to bring order out of the confusion that, among other things, the arrest of progress indicates. Ability to

strengthen the foundation knowledge and at the same time to avoid the equally grave danger of monotony is one test of a good teacher. Examinations given during periods of retardation—the plateaus of the curve—do not in any way show the progress of the learner. For this reason tests of proficiency should always be given at a time when the pupils have been showing special proficiency for a few days, when they are well along in the upward movement of the curve. Since the progress of different children does not coincide from day to day, the disadvantage of class examinations is obvious.

Monotony seems to be one of the unavoidable obstacles in all learning. It is a phase of the mind's inability to continue attentive to the same object. At the start a new subject of study is interesting. This is due to its novelty, and, in addition to this, progress at the outset is rapid. The acquisition of the first elements is easy, and the rise from zero knowledge is so quickly made that the mind enjoys the transition. For the moment, each day brings something new. But very soon some of the difficulties of the subject-matter become obtrusive. The superficial grasp of a few elements that did very good service at first, when everything was simple, no longer meets the requirements. The details have greatly increased in number and their loose connection is easily broken. As a result they soon fall into confusion. It is necessary to go back and make another start, and so the novelty that stimulated the interest in the beginning comes to an end. Delay is now necessary, at least in many subjects of study, that reaction to some of the elements of the work may be automatized. This is the first plateau of the curve.

But the monotony is probably not the only cause of the retardation. That lies in the nature of the learning process. The loose hold on the first principles of the subject was sufficient to bring the first advance, but now the complications have increased, and to understand their relations requires attention. The mind must, therefore, be released from supervision of the simpler elements with which it has hitherto been occupied. Response to these simpler elements must become a habit, with the execution of which the learner is wholly unconscious. Though the feeling of monotony does not cause this arrest of progress it doubtless tends to prolong it, and to lessen its effect is one of the problems of teaching. Diversity of material, as well as new ways of presentation, are now important, and the time is suitable for showing the larger implications of the topics under discussion. The difficulty is greatly increased by the fact that the necessary retardation, by reacting upon the mind, tends to prolong and increase the feeling of *ennui*. The ball-tossing experiments were especially suited to the observation of the changes in the attitude of the mind toward the work. The feeling of monotony during the early part of each trial, always noticeable in those who had gained a certain proficiency in ball-tossing, suggests a similar feeling in children who are compelled to sit and listen to explanations of topics which they clearly understand, and points to the individualization of instruction as the line of educational advance. It was observed by those engaged in these experiments that the possibility of doing something to beat their own record was the surest antidote for monotony. This would, naturally, be even more characteristic of children than of adults,

though in these investigations it was found to be exceedingly strong.

It is suggestive that in all these experiments the method by which the reaction was improved was hit upon unconsciously. The learner simply tried to do the thing upon which he was working, and, in the process, he found himself using an improved method, and the new acquisition was always well along before it was discovered. This was particularly evident in the ball-tossing and in typewriting, and, while it was more difficult to detect in learning Russian, there was every reason for believing that it was operative here also. In order to test this matter further, the writer has since tried the experiment of learning to handle a punching bag skilfully, and here also it was quite clear that all of the delicate movements by which the bag is made continually to rebound, with a rapidity that the eye cannot follow, were happened upon quite unconsciously. There is a subconscious utilization of experience. How this is brought about without the participation of consciousness is a difficult question. Experience certainly seems to play an effective part in the life of organisms so low in the scale that few are willing to credit them with consciousness, at least in the usual acceptance of the word. "Behavior having the essential features of the method of 'trial and error,'" according to Jennings,[1] "is widespread among the lower and lowest organisms, though it does not pass in them so immediately to intelligent action." Now, as Professor Jennings points out,[2] actions of this type necessarily involve the ability to distinguish "error"

[1] *Contributions to the Study of the Behavior of Lower Organisms*, by Herbert S. Jennings, p. 237, Carnegie Institution, Washington, 1904.
[2] *Loc. cit.*, p. 250.

from "success." But while the improved ways of doing a thing come unconsciously, those that survive do so for a reason, and that reason is a conscious one, and in this lies a part of the educative value, in its intellectual aspect, of manual training and of play. The child finds himself doing a thing in a certain way, and the question of its success comes before him for decision. The value of constructive play as a factor in development is an unworked educational mine. The author has learned of a boy of about fourteen who worked out a complicated system of military tactics with cards as soldiers. It was not merely "playing soldier." He read about military manœuvres, and planned flanking movements and retreats, introducing rivers and woods, and so was dealing in play with many of the problems of real war. This was distinctly an intellectual training.

Returning now to the nervous system, its subconscious utilization of experience may be accounted for by the organic friction that accompanies unsuccessful reactions. Though, in the cases under discussion consciousness did not participate in the first selection of successful methods, the mind was, nevertheless, conscious of success or failure. The repetition of successful movements, *i. e.*, those that contribute to the success of what the mind is consciously seeking, results, as we have seen, in an organic contentment which heightens the neuro-muscular tone and favors their repetition. This subconscious satisfaction is parallel to the conscious satisfaction that comes with recognized and intended success.

The effect of fatigue on progress in learning has never been adequately tested, most of the experiments

having been made with mental processes which have already become automatic. While these investigations were not undertaken primarily to test the effect of fatigue, there was frequent opportunity to observe its influence, and the evidence that it is disastrous to the finer acquisitions which characterize growth in skill and knowledge was decisive. In ball-tossing it was the delicate movements that suffered, while in the more strictly mental activities it was the higher forms of associations.

Closely connected with the subject of fatigue, particularly in its relation to school children, is the question of the sort of practice that is effective for progress. It seems quite clear from these investigations, as the writer has already said, that it is not mere practice that counts for progress in learning, but *successful* practice.[1] Consideration of the factors in the process would seem to sustain this view. Learning is the automatization of certain activities, and any disturbance of the organic tone, whether comparatively permanent, as in lowered physical condition, or temporary, as in fatigue, interferes with the automatization. When erratic impulses are interpolated, incipient habits, always sensitive in their beginning, are deranged. Practice, then, instead of being carried to the point of *ennui* or fatigue, should always cease while the learner is still fresh and enthusiastic. The books of school children should be closed the moment there is any indication of lassitude. Carried beyond this point, study tends to delay progress by starting erratic impulses that end in confusion.

Throughout these investigations the significance of

[1] See also R. S. Woodworth's "The Accuracy of Voluntary Movement," *Psychological Review Supplement*, No. XIII, 1899.

the time element in learning was continually emphasized. From its very nature progress cannot be continuous. The accumulation of details of the subject-matter brings frequent periods when a certain length of time is needed for difficulties to adjust themselves, and until this mental organization is completed the facts are not readily usable. It is probable that no amount of work would make progress continuous. Up to a certain point increased effort during periods of arrest of progress may shorten the delay, but effort to the point of mental strain, at such a time, is of more than doubtful wisdom. The mind does its share toward mental clarification if the material is put clearly before it, but time is always needed if the organization is to be the best of which the mind is capable, or if the resulting acquisition is to be permanent. In the study of typewriting this question was experimentally tested, and it was found that effort to "spurt" did not bring the desired result. Indeed, the exertion seemed rather to interfere with the automatization of associations and movements. Time is needed, and time the mind *will* take. Overstrain and hurry tend to mental confusion rather than to clarification.

Equal amounts of work do not produce equivalent results. Throughout these investigations this fact has been continually forced upon the writer. Many times, when the effort put forth seemed unusually successful and he felt that it must markedly raise his score, the result would fall far below what had been accomplished at other times. To account for this solely by a difference in the difficulties to be overcome does not satisfy the conditions. Difficulties are always relative, and become wholly negligible in the presence of mental

organization which comprehends the situation. We have here one phase of the time element involved in learning.

By far the greater part of the learning period is spent on plateaus, when both teacher and pupil, failing to understand the situation, feel that they are marking time. Now the most interesting thing about this is the almost paradoxical fact that these periods of retardation are the time when the real progress is being made. Relations between details are now being worked out, and the associations growing out of this process are becoming automatized. These are the crucial days in the work, and any attempt to shorten the process artificially is almost certain to bring disaster. In learning, as in development generally, one period grows out of another, and the success of later associations and automatizations depends upon the accuracy and effective force of those that were formed before. Americans who spend several years in Germany pass through a long period of discouragement. Though they study the language faithfully, and avail themselves of every opportunity to practice conversation, they seem to make absolutely no progress. The length of this plateau-period varies with different persons, but all experience its oppressiveness. Now the most curious feature of this plateau, aside from its overpowering monotony, is the suddenness with which it finally disappears. Several have told the writer that they went to sleep one night unable to understand anything, as it seemed to them, and utterly discouraged, and awoke the following morning to find that they had mastered the language, that they could understand practically everything which was said to them. The word-associations and national

peculiarities of thought sequence had been automatized during the long period when no visible progress was being made. The daily study counted for so little in comparison with the mass of possible words and idioms, that the partial acquisitions made from time to time could not assert themselves. Before this was possible it was necessary that the accumulation be great enough to give them effective force. The process by which these acquisitions were automatized was largely subconscious. Time, with patient, steady work, seems to be what is needed, and little immediate manifest effect should be expected. The manifest advance, that which is revealed by the curve or by examination marks, which is the same thing, is discouragingly brief. These sudden leaps forward are merely transitions from one acquisition period to another, and indicate that the details upon which the mind was working have taken on a certain order and that new ones may now be added. A great part of the improvement of brain consists in growth in power to understand relations, and it is during the periods of retardation that the processes, out of which a correct interpretation comes, are active.

CHAPTER VII

THE RACIAL BRAIN AND EDUCATION

Man is a better thinker than the animals below him because the precarious conditions which surrounded his early progenitors, by demanding new adaptations, opened the way for a fresh start in cerebral organization. Geological and climatic changes made the opportunity, and capacity to vary in response to emergencies was equal to the requirement. All thinking ends in action; this is its evolutionary justification, and man in the course of his development has become a better thinker in order that he might act in a manner more consistent with the needs of the situation. In a large sense all actions are of the reflex type, since their excitation may be traced finally to external stimuli. From the side of intelligence the question is, What goes on between the arrival of the stimulus and the action which it prompts? In animals with a very simple nervous system action immediately follows the excitation. With a better organized nervous system some delay may occur, while in the higher animals, and particularly in man, the process of selection becomes greatly involved. Man has no more avenues for receiving impressions from the outside world than are possessed by many of the lower animals. His mental superiority consists in his ability to work up much more

completely the crude information received through his sense organs. The organization of the human brain with its enormous number of association-fibres gives its possessor a distinct advantage over animals with a less highly evolved central nervous system, and it is just this improved nervous organization which gives man his intellectual preëminence. Man can act better because he can think better, and he can think better because he has a more highly evolved brain. There is no reason for believing that the average size of the human brain has increased for many thousand years. Indeed, there does not seem to be any clear relation between the size of the brain and intelligence. As a result of the examination of two hundred and eleven crania gathered from widely separated parts of North and South America, Morton found that "we have the surprising fact that the brain of the Indian in his savage state is far larger than that of the demi-civilized Peruvian, or of the ancient Mexican tribes," [1] and Tiedemann, after examining skulls of people from almost all known regions of the world concluded that, so far as size of the brain enters into intellectual capacity, primitive races do not differ essentially from Europeans.[2] Bischoff, also reports that the brains of four Pelew Islanders gave an average of 1,402 grams, with the lightest 1,361 and the heaviest 1,474 grams.[3] He also found a Bengal's brain which weighed 1,531 grams. The average weight of the brain of modern civlized man does not greatly exceed 1,400 grams.

[1] Samuel George Morton, in *Archives of Aboriginal Knowledge of the Indian Tribes of the United States*, edited by Henry R. Schoolcraft, Vol. II, p. 330.

[2] *Das Hirn des Negers mit dem des Europäers und Orang-Outangs verglichen*, p. 48.

[3] Theodor L. W. von Bischoff: *Das Hirngewicht des Menschen*, p. 82.

Huschke [1] makes it 1,424 grams for man and 1,273 for women. Hrdlička examined an Eskimo's brain which weighed 1,503 grams. "As a whole," he says, "this Eskimo brain is heavier and larger than the average brain of white men of similar stature." [2]

After the human brain attained approximately its present size, its further evolution seems to have been chiefly confined to improving its internal organization. Charles L. Dana found no special peculiarity in the brain of a full-blooded Bolivian Indian, but the relative difference in the size of its several parts, as well as the local variations in fibre-mass, led him to conclude that the brain "was a better motor and sensory than thinking and talking organ." [3] Kaes [4] believes that in the second and third association layers of Meynert he has found the part of the brain in which, during the progress of civilization, improvement especially occurred. It is certainly suggestive that the areas which he thinks are preëminently the region of race cerebration, coincide with those in which he also seems to have discovered a new growth of association-fibres, beginning in civilized boys and girls at about eighteen years of age. Both Kaes and Vulpius agree that these same second and third layers, which the former is convinced are deficient, among primitive people, in association-fibres, are undeveloped in children. But still earlier in life the lack of organization goes much farther. The acts of newborn infants are reflexes of the simplest sort—spinal reflexes—because, at this time, the cerebrum is isolated

[1] Emil Huschke: *Schädel, Hirn und Seele des Menschen und der Thiere nach Alter, Geschlecht und Rasse*, p. 57.
[2] *American Anthropologist*, New Series, Vol. III, p. 454.
[3] *Journal of Nervous and Mental Diseases*, New Series, Vol. XIX, 1894.
[4] *Wiener medizinische Wochenschrift*, Vol. XLV, 1895, pp. 1734 and 1770.

from the lower centres. Increase in the number of brain-cells probably ends about four months before birth, and henceforth growth in intelligence depends upon the healthy development of the immature cells and the growth of nerve fibres to functional maturity.

The child begins life at the spinal level of intelligence. Nerve-impulses take the short circuit from periphery to cord, where they are transmitted, either directly or through very few commissural cells, to motor cells, and action follows reflexively. Since the cerebrum has not yet been connected with the nerve-circuit, all that the cortical centres mean for the future intelligence of the individual is a matter of development during infancy and childhood. The evidence indicates that at first the nerve-centres act without much reference to one another. Inhibition is absent and control is erratic. There is no coördination in movements. Inhibition, serial order, and control are for individual acquisition. The nervous structures are inherited by the race, but each individual must learn how to use them.

Since life consists in reactions to impressions made by external conditions and events, the nervous system must be connected with the surface of the body, and the intelligence of organisms is then measured by their sensitiveness to slight variations in these impressions and by their ability to bring them into some consistent relation, so that the bearing of past impressions upon those now sensed may be understood and may facilitate an adequate interpretation of the confronting situation to which the organism must react. This is the utilization of experience.

Briefly sketched, the central nervous system may be thought of as made up of afferent and efferent fibres

with their sensory and motor cells, and of commissural cells which elaborate and, through their fibres, distribute impulses arriving over afferent nerves. Shortly before birth, medullation, which began in the sensory nerves at the level of the cord, has advanced through the medulla as far as the cerebral cortex. All fibres of the cord are now ready to function, with the exception of the pyramidal tract—the direct motor pathway from the cortex into the cord. This is the voluntary motor tract, and as voluntary movement is not yet possible, the cerebral structures not having been developed, there is no need for the pathway. Probst's studies [1] have shown that cortical cells are fully three months behind those of the cord. It is the reflex centres which are immediately needed by the child.

At birth the various structures that later assume certain very definite functions have not yet come into existence. The cells are homogeneous and function is undifferentiated. The intricate system of association-fibres, which enables the different senses to contribute toward the interpretation of sensory data and, with memory, makes possible the utilization of past experience, has not yet become functionally active. It is usually not nature's way to create in a moment in an individual what has taken her ages to elaborate in the race. These fibres will appear later, and as the several paths are opened the mental life takes on a new coloring. Somewhere here, and in the cells from which they spring, the distinctively human lies concealed. The fundamental difference between the immature nervous system and that of the adult is the lack of organization in the former. It is the difference between compara-

[1] *Gehirn und Seele des Kindes*, 1904

tively simple and marvellously complex machinery. The so-called higher mental processes do not appear in the child because the structures necessary for them are not yet formed, and they are not formed because the needs of human life cannot well be met by ready-made machinery. So long as requirements are satisfied by a fairly definite response to a given stimulus, the nervous mechanism can be handed over at birth nearly or quite complete, but when, as with man, great variability in response is demanded, time is needed for growth and development.

The appearance of the cerebrum in the nervous circuit marks the beginning of the larger intellectual life. The nervous impulses starting at the periphery, which up to this time have passed almost directly into motor neurones of the lower centres, now take a wider circuit. The first cerebral fibres to become medullated, according to Probst, are those connecting the cortex with the thalami, the cerebral continuation, as Edinger finds, of the spinal sensory path, whose fibres are the first in the cord to become functionally active. Sensory impulses are now no longer limited to the spinal nervous elements. The range of nervous action is enlarging. In the individual, as previously in the race, new centres for control develop as need for them arises, and with increase in the complexity of organization the nervous system is brought into more intimate relation with the outside world. It receives more incentives to action from its environment, because its capacity for sensation has been increased and its environment enlarged. Interpretation of stimuli plays a larger part in its responses, and experience begins to be effective in the choice between several possible reactions, and so re-

sponse, which hitherto has been restricted within narrow limits, and, in a degree at least, determinable, now becomes incalculable.

As these changes are going on during the formative period, the inference that they may be influenced by education is not unreasonable. The factor of chief importance in development through education is the nature of the excitation. In lower animals instincts peculiar to the species may not appear until called out by exciting stimuli, and there is every reason for assuming for man a similar need of appropriate excitation. The belief that children, if allowed freedom, will find in their environment what is needed is a good working principle. The error in it is that environments differ, and naturally the elements which they lack cannot be obtained from them. City life, depriving children, as it does, of workshops, woods and fields, does not contain the ingredients that in the country act as exciting stimuli for many racial instincts which are believed to be of supreme importance in brain development.

In the organization of the nervous system, proceeding as it does from birth, the axons and dendrons put out branches that in turn send out finer, and these still finer, fibrils, which facilitate the passage of nerve-impulses. The higher animals stand in the scale of intelligence the more their nerves branch. Profusely branching cell-fibres, besides furnishing more paths for a given impulse, aid in the nutrition of the entire nervous system, and give an opportunity for modifying impulses to influence the action of a nerve-current. Education, then, from the physiological side, would seem to consist in conserving and elaborating the cen-

tres for nervous energy, and in opening new paths of discharge. The branching fibres of the nerves over which incoming impulses arrive are not in permanent contact with the branches of the receiving dendrons. Just how the varying responses of the organism to similar stimuli are to be explained is not certain, but that it is made possible by organized nervous centres and by the ramification of fibres cannot be questioned. The increase in the variety of responses with the increase in the complexity of the nerve elements is evident when we consider races and men of low intelligence. Their reaction to a given stimulus is more easily determined than is that of those of high intelligence. The latter find modifying elements in the stimulus, as other possible ways of viewing the object or event, and the impulses to which these give rise play their part in determining the path which the first impulse shall take as well as its intensity. For those with poorly organized brains there is but one possible response to a given stimulus, and this response follows the excitation immediately. Those with better organized brains see below the surface. They consider causes and effects, and so find new and richer meaning in that which occasions the excitation. Through these inhibiting and reenforcing impulses springing from other senses or from nerve-centres, the more primitive and native course of a nerve-impulse is changed, and deliberate action results. It is a mistake, however, to assume that this grows naturally out of the nature of the nervous system. Truly, to reënforce and inhibit action is a nervous function, but to vary the one or the other because of some slight change in the conditions indicates superiority in the evolutional scale, and, among individuals at

the same level, the delicacy of this power is a test of their discriminative intelligence. Now much of this lies within the province of education. It is a phase of brain improvement.

In early infancy the projection fibres push their way from the central white matter into the cortex, while, about the fourth month, association-fibres running parallel to the surface of the brain make their appearance in the inner and outer cortical layers. A few fibres are to be seen also in the middle layer as early as the eighth month, but they do not occur here in great numbers until the seventeenth or eighteenth year, when, according to both Kaes [1] and Vulpius [2] they begin a new growth. This is the layer that is largely made up of the second and third association-layers of Meynert, the growth in complexity of which, as we have seen, Kaes thinks may make the difference between primitive and civilized man as well as, in some degree at least, between children and adults. In childhood this entire middle cortical layer is noticeably deficient in association-fibres, but after the new growth of the latter teens has begun, they increase in numbers rapidly, and at about thirty-eight, as Kaes' investigations show, they are twice as numerous as at eighteen. The discovery that the growth or medullation of association-fibres continues so much longer than has been commonly supposed, is decidedly significant for education. Kaes and Vulpius agree that their medullation continues beyond forty years, and perhaps fifty. At any time, then, before middle life, nutritional disturbance of any sort may interfere with fibre-development. It is quite cer-

[1] *Wiener medizinische Wochenschrift*, Vol. XLV, pp. 1734 and 1770; *Münchener medizinische Wochenschrift*, Vol. XLIII, p. 100.
[2] *Archiv für Psychiatrie und Nervenkrankheiten*, Vol. XXIII, p. 775.

tain that, at least in parts of the brain, the number and complexity of functionally active fibres varies with age, and the opinion that there is a definite relation between intelligence and fibre-growth, which a more accurate knowledge of the finer structure of the brain may reveal, can no longer be thought unreasonable. So well established is the continual appearance of new association-fibres that Edinger[1] thinks the intellectual capacity may be increased by the improvement of cerebral organization by perfecting paths already formed, and, perhaps, through starting a new growth of these association-fibres. It is probable that many of these structural changes occur among the dendrons. That these are both phylogenetically and ontogenetically of later growth than the axis-cylinder processes, and that they are more numerous in the nervous system of higher animals, indicates that their appearance and numerical increase mark epochs in the growth of intellect. Cajal[2] believes that man's higher psychical powers cannot be accounted for by the morphology of the cortical cells or by their grosser connections, but that the explanation must rather be sought in the marvellous richness of the interrelations which the cell elements have assumed during the evolutionary process. So far as mere connections and variability of cell types are concerned, the cerebrum, he says, is far inferior to the cerebellum and retina. While accepting the prevailing view that brain training cannot increase the number of cells, Cajal strongly inclines to the opinion that the number of protoplasmic processes and collaterals may be increased, and in this way the associational reach may be enlarged.

[1] *Bau der nervösen Zentralorgane*, 7th ed., Vol. I, p. 329.
[2] *Archiv für Anatomie*, 1893, p. 319.

If Kaiser's [1] investigation of the increase in the number of developed cells in the cervical enlargement of man is indicative of the increase in the cerebrum, they double between birth and fifteen years of age. Donaldson [2] is of the opinion that in the cortex this growth may continue even till the fortieth year, and measurements of the head at different ages seem to indicate this. West [3] found from his examination of 2,800 pupils in the Highland Military Academy and Worcester (Mass.) Normal and public schools that their heads continued to grow till twenty-one years of age, and Venn [4] concluded from his measurements of the heads of more than 2,000 Cambridge (England) students that the human head increases in size for some years after the age of nineteen, and Galton [5] supports this conclusion.

As the sole source of the mature nerve-cells in the brain of the adult is the undeveloped cell-elements present at birth, the future brain development consists in the change of these original cell-elements into functionally active cells, and in their improved organization. Von Kölliker [6] considers the nerve-cells as the sole seat of psychical activity. The total productive efficiency of this activity would, of course, involve the perfection of their grouping. Intellectual capacity depends in large measure upon the number of functionally active, vigorous cells, and the perfection of their physiological organization and development in both of these directions may unquestionably be furthered or impeded by

[1] See Donaldson's *Growth of the Brain*, p. 164.
[2] *Ibid.*, p. 165.
[3] *Archiv für Anthropologie*, Vol. XXII, pp. 13–48.
[4] *Nature*, Vol. XLI, 1890, p. 452.
[5] *Ibid.*, p. 165.
[6] *Handbuch der Geweblehre des Menschen*, Vol. II, p. 677.

environment and education. That no brain ever reaches his highest attainable degree of efficiency seems certain from the fact that large numbers of undeveloped cells are always found in the brain of adults. The condition is much the same, only less accentuated and not necessarily in the same localities, as in those who have lost the use of one or more sense-organs in childhood. Donaldson, for example, found that "the number of granules and partially developed cells was excessive in the defective portions of the cortex of the blind deaf-mute Laura Bridgman, in whom normal development in those localities ceased at the end of the second year of her life" [1] through loss of vision and hearing. In mental defectives the condition is still more marked. Hammarberg [2] examined the brains of a number of persons in different stages of weak-mindedness, and in all cases he found the cells defective in size and number and vitality. It would, of course, be unreasonable to expect to find all of the cortical cells fully developed in a normal individual, but intelligence being the result of the activity of the entire brain, any large number of rudimentary cells would seem to indicate unrealized powers. A child begins life with certain native endowments which have been inherited from his immediate ancestors, or from those more remote. That there are limitations to his possible brain growth cannot well be doubted, but that these limitations are as restricted as is often assumed is improbable in the light of our present knowledge.

"Von Kölliker, in a discussion of the physiological

[1] Donaldson's *Growth of the Brain*, p. 240.
[2] *Studien über Klinik und Pathologie der Idiotie*, Upsala, 1895.

functions of the elements of the brain, says that all nerve-cells possess in the beginning essentially the same function, and that the manifestation of function depends entirely upon the manifold external influences or stimuli which affect them, and upon the many possible modes of responding to these excitations." [1] It is probable that the modes of responding to excitations grow with the opportunities to respond, provided these opportunities are of the right kind. The protoplasm becomes enriched and the cellular connections are multiplied by the growth of innumerable nerve branches, collaterals and fibrils. In this way the nervous paths already formed are strengthened and new ones made. Other things being equal, the greater the number of intercellular connections, the greater the intellectual power, and it is beyond question that these intercellular connections increase according to the demand for them in the environment.

Of great interest in connection with the relation of intelligence to brain organization are the areas which have no motor or sensory function. If one takes a diagram of the brain and marks with black ink those parts that experiments have shown to be sensory areas, and with these also the regions whose electrical excitation produces motion, large areas—two-thirds in man according to Flechsig—will remain uncolored. These areas, Flechsig insists, are not connected, as are the sensory and motor regions, with the lower centres, but are association areas whose fibres bring neighboring or distant cortical centres into functional relation with one another. While there is as yet no convincing evidence that these "association areas" are the especial

[1] Barker's *The Nervous System*, p. 256.

location of the higher intellectual processes, still the fact that they decrease in extent as we descend the animal series indicates an evolutionary significance. It may be that they represent the more plastic portions of the brain.

Our knowledge of what is involved in cerebral organization is at present wofully meagre. We are acquainted with only its most conspicuous features, but there is no reason for supposing the brain to be exempt from the conditions essential to the growth and development of other organs. Aside from analogy, however, there is abundant proof that the development of nerve elements is dependent upon opportunity to function. Appropriate nerve-excitation is not only nerve exercise, but in addition it promotes the metabolism and growth of the cells in the stimulated centres. The work of Seguin and his successors has demonstrated the possibility of improving mental function through cerebral activity caused by external stimuli. It is a matter of common knowledge that if a peripheral nerve, through disease or other causes, loses its power of functioning, degenerative changes are liable to occur which may affect not merely the nerve itself, but the cell in which it has its origin as well. Exercise is necessary for the proper nutrition of nerve-cells as well as of other organs, and if this activity is wanting the cell loses its sensitiveness to excitation.

A rightly ordered system of education must grow out of the physiological requirements of the nervous system. In childhood the nerve elements are not rigidly set. They are flexible in the sense that their organization is to be largely determined by their environment, and the

education that children receive in the school-room constitutes an important part of this environment. Associations may be formed that have no validity outside of the unreal conditions in the teacher's mind, and as we are dependent in our thinking on the connections made in the brain by association habits, such associations must prove disastrous to the child's mental development.

Recent studies have brought out some facts bearing upon psychic processes that must, when clearly understood, profoundly influence education.

The nervous system of the lower vertebrates is composed of separated ganglia more or less loosely connected. As we ascend the scale of animal life the ganglia are better connected; there is more centralization. The human nervous system is decidedly centralized. But this is not all. Within this centralization there are all degrees of variation in the connection of adjacent and remote cell groups by associative fibres, and it is in this that the quality of education reveals itself. The higher mental activities, those involving thought and reasoning, grow out of the lower, and the supposition that they exist by and for themselves and that they can be matured irrespective of the lower processes, springs from an absolutely false conception of psychic development. Spontaneous and reflex movements produced through the discharge of lower centres precede conscious movement. Indeed, they are the necessary foundation for consciousness. Willed action could never take place were it not for the sensations caused by these movements and left as memory images for future sub-conscious reference.

The most sensitive parts of the body are those that

are most mobile, and according to Mosso[1] this increased sensitiveness is not due to a greater peripheral nerve ramification or to a more highly organized end organ, but to the fact that greater mobility has produced a more irritable brain. In other words, movement develops the brain. This view is further supported by the fact noted by various writers that intelligence in animals increases with the increase in mobility of their extremities. "The cephalopods, which have eight arms, formed of muscle substance, and provided with suckers, stand, among the molluscs, nearest to the vertebrates on account of their strength and power of movement. It was movement, probably, that developed their brain-ganglia, for these are larger in the cephalopods than in the other molluscs. As they possess a good memory and a high intelligence, so they also exhibit more intense emotions, as may be seen from the great facility with which the color of their skin changes."[2] Romanes also noticed the same relation between animals of high intelligence and movement of the extremities in grasping. The first human beings must have been dumb, and the increasing need for means of communication would have naturally led them to an excessive use of gestures, which are known to have preceded spoken language. In the brain development following the increasing frequency and complexity of these gestures, as man's need for varied expression grew, may, perhaps, be found the origin of spoken language. The close connection between the centre for speech and the centre controlling the right

[1] Lecture before the Students and Faculty of Clark University, Decennial Celebration, p. 390.
[2] *Ibid.*, p. 390.

hand, is evident, as Colin Scott has shown, from the apparent increase of strength in the hand after the speech centre has been stimulated by declaiming. Baldwin has already suggested that right-handedness may have been the turning-point in passing from gesture to speech. The growth of movement has been from few to many and from simplicity to complexity, with corresponding increase in precision. This has not been due merely or even largely to change in muscles, but to the development of the brain resulting from more varied movement. "It is not the process of consciousness which makes our hands dextrous, but perhaps the movements of the right extremities, which effect the higher psychic development of the left cerebral hemisphere. The influence of the hand upon the development of language is evident from the fact that an aphasic patient is made to write in order that he may gradually regain the power of speech." [1] In Mosso's[2] opinion, the brain cells and fibres can be helped to mature in early childhood through muscular exercise. In this way the motor-nerve paths may be consolidated before intellectual work begins.

The method of teaching generally followed to-day is directly antagonistic to the physiological needs of children. Instead of recognizing the demand of their organism for movement, they are put into seats where they meekly count wooden toothpicks, and educational experts read elaborate papers before tired teachers on the length of time children may be kept in their seats without permanent injury.

The aim of teaching, we are told, is to impart knowl-

[1] Mosso: *Clark University Decennial Celebration Book*, p. 392.
[2] *Ibid.*

edge, power and skill. By the present method we certainly impart a kind of knowledge, but it does not stay long, and power and skill are at a decided disadvantage. It is an attempt to develop the higher nerve centres without regard to the lower. We like to wave the achievements of our higher mental powers before the admiring crowd, and are not a little anxious lest their seemingly ignoble origin may discredit their present claims. Educational methods which encourage memory and local or simultaneous associations at the expense of connected thought and of reaching the inner meaning are worse than worthless. If we could remedy to-morrow the mistakes of to-day, though time would be lost, the harm would be greatly lessened. But every mental process leaves its trace in the nerve-cells and forever afterward exerts its influence in the intellectual life of the individual. Notwithstanding the great variation in cell development of which every brain is capable, the elaboration of the protoplasm and intercellular connections, which alone bring this development, is left largely to the chance activity that information laid away in the cells as memories may arouse.

In the evolution of the nervous system the phylogenetically oldest is the first to become set. There is little, if any, chance for variation in the inherited structure and mode of action of the nervous elements of the cord and medulla, or even in some of the other centres of comparatively later origin. They represent a stage in development when survival required that certain things be done in a pretty definite way. These activities are no less fundamental than when they were the physical basis of the highest of which the organism was capable, and during many ages there has been no

cause for any essential change in the physiological processes underlying them. Racial heredity, therefore, hands over to us, ready-made, the nervous structures adapted to their performance. With the cerebral cortex, however, the situation is very different. So clear is the course of evolution here that we are able to test experimentally in animals the progressive assumption of function by the cortical centres,[1] and with it the gradual improvement in bodily control and increase in intelligence. The cortex, however, still retains the capacity to vary. This is because it is the latest evolutionary achievement in the nervous system, and nature is always slow to cast the final mould and call her work finished. It is the cortex, therefore, that presents the possibility of individual improvement. But this very capacity for variation exposes it to the dangers as well as to the benefits of change. Reversion is always easy for newly acquired characteristics. Among the lower animals natural selection, if sufficiently intense, takes summary action in this matter and preserves the quality of the species. In human society the strict application of this selective force as found in nature is impossible and also undesirable, but this lack of external constraint calls for compensation consciously adjusted, if the quality of brain is to be maintained. Individual

[1] Steiner: *Die Functionen des Centralnervensystems und ihre Phylogenese*, Braunschweig, 1885 and 1898. Schrader: "Zur Physiologie des Froschgehirns, Pflüger's *Archiv fur Physiologie*, Vol. XLI, 1887, p. 75; "Zur Physiologie des Vogelgehirns," *Archiv fur die gesammte Physiologie*, Vol. XLIV, p. 175; "Zur vergleichenden Physiologie des Grosshirns," *Deutsche medizinische Wochenschrift*, 1890, p. 306; "Uber die Stellung des Grosshirns im Reflex-Mechanismus des centralen Nervensystems der Wirbeltiere," *Archiv fur experimentelle Pathologie und Pharmakologie*, Vol. XXIX, 1891, p. 55. Munk: "Uber den Hund ohne Grosshirn," du Bois-Reymond's *Archiv fur Physiologie*, 1894, p. 355. Goltz: "Der Hund mit verkürztem Rückenmark," Pflüger's *Archiv fur Physiologie*, Vol. LXIII, 1896, p. 362. Edinger's *Vorlesungen uber den Bau der nervosen Zentralorgane*, 1904, Vol. II.

deterioration must surely be easy if new cerebral tracts may be formed by brain activity. 'The purpose of education is improvement in action, and this presupposes better cerebration, and there is abundant evidence that the human brain is still in the process of evolution. The fact that certain functions may be vicariously performed by centres not usually concerned with them shows that, in the more recently gained characteristics at least, the brain has not become set. Now it is of the utmost importance that this plasticity be preserved. Modern psychology postulates that nervous activity underlies psychical activity, but it is incredible that a given group of cells, with their connecting fibres, should be exclusively concerned with producing one thought or one state of consciousness. Probably that is the tendency when a given form of thought becomes habitual, but habits of thought rest upon habits of nervous discharge. The man who thinks in ruts does so because a given idea always produces the same nervous discharge, and the resulting currents follow the same worn paths. Mental efficiency does not depend merely, nor even chiefly, upon the amount of nervous energy available. It is a matter of nervous reciprocity, of coördinated impressionability and action. Abundant energy may exist, but go to waste in uncoördinated diffusion. This is seen in young children who are learning to write, and in those who are older, in their efforts at control of the attention. The intellectual helplessness of high-school pupils and college students is evidence of the failure of our tutelary method of education to create habits of control of nervous discharge.

CHAPTER VIII

EXPERIMENTAL PEDAGOGY

A few years ago there were found scattered through the four lower rooms of one of the St. Louis grammar schools sixteen children, who for various reasons had not succeeded in doing one quarter's work during a period varying, with different children, from one to two years. They ranged in age from eight to ten. Some were naturally backward; others had been irregular in attendance; one, Frank, was a chronic truant. To insure an occasional day at school, a member of the family would lead him by the hand into the school-room. The tears in his eyes betrayed how unwillingly he had come.

These sixteen were grouped in one class and assigned to an especially observant and thoughtful teacher. She found she must begin with work ordinarily done by children at about their eleventh week in school. Their stolidity was the teacher's despair; she would have hailed disorder or mischievousness as signs of life. As it was, they seemed intellectually to differ from logs only in the fact that now and then they responded by a nod. Their grasp of number enabled them to show how many ears one cat has, but they were unable to extend their calculation so far as two cats. The teacher concluded the story of her difficulties with this class by

saying that from the way in which they used their hands one would infer that they were much younger than they really were, there was such weakness and lack of control in their movements. This, with their lack of ideas, made the thought of their writing during seat-work time an absurdity. Hence it was decided to introduce some simple form of hand-work.

As constructive work was not a part of the course of study there was no means of obtaining suitable material for manual training, and so the simplest and most inexpensive work, spool knitting, was chosen. Zephyr of various colors was supplied by the teacher, and the children brought their own spools and ordinary pins.

It was soon found that the zephyr was beyond their control. The weakness of their fingers, the small pins, and the inability of the children to hold the zephyr so that the loop about the pin would remain loose enough, made it impossible for them to proceed. The teacher then gave them split zephyr. This proved manageable. For the first time their faces lighted up when they saw the cord projecting beyond the lower end of the spool. They grew animated enough to talk, and would exclaim, "See! it's coming through!"

The children were left free to use the color they wanted and to change to another when they chose. They worked at their knitting during seat-work periods whenever they had finished other allotted tasks.

One child, a little stronger than the rest, succeeded in using the heavier zephyr. The others, noticing the larger and firmer cord that resulted from the use of this zephyr, now wanted to try again what before had proved too hard.

From the day that spool-knitting was begun attend-

ance improved. Frank, the former truant, did not miss a day. Later he was taken ill with scarlet-fever. During his convalescence his mother was puzzled to explain why he should now be so unhappy at not being allowed to go to school. Another child, whose mother wanted to take him down-town to get a pair of shoes, said, "Oh, I can't miss school to-day; we're going to have a new color for our knitting."

After having worked for some time with no other stimulus than the pleasure in the immediate result, the children began to compare the length of the cord made by themselves with that of their neighbors. It was then suggested that each find just how long his cord was. The use of the yard-stick and the foot-rule now became interesting. One boy discovered that he had four feet, or one yard and one foot of cord; another, that he had a yard and eighteen inches.

The consciousness that they could do something with a tangible result awakened a certain degree of self-respect. They grew more responsive in the ordinary school studies. It became a little easier to appeal to their imagination, and slowly but gradually they learned to tell a story to their classmates. Even problems in arithmetic came to have some meaning to them.

It was now evident that spool-knitting had served its purpose and must be superseded by something that would appeal afresh to their interest and make greater demands upon their skill. Old slate frames were turned into looms by putting a row of tacks along the ends. Wool for weaving was obtained from the ravellings of small pieces of ingrain carpets bought at the carpet house by the pound.

At the start the teacher was obliged to string the warp herself. The children chose their own colors as before. At first a color for the second stripe was chosen simply because it pleased the child while he held it in his hand. Later, he would carry it to his seat to see how it would look alongside the color of the first stripe. Then some discovered that it made the little rug look pretty to go back to the color first used, and thus came a recognition of the value of repetition and of the effect of stripes of different widths.

By the end of the term the children had learned to make rugs and hammocks, and to knot fringes and twist cords for the hammocks. On the last day of the half-year, all the mats made of the knitted cord, the rugs, and hammocks were arranged along the wall at one side of the room. While the children sang their morning song, Frank, in the front seat, sat, with his hands clasped, looking lovingly, almost worshipfully, up at his work on the wall. The bearing of all the children had changed; it was firmer and freer.

The following fall the class was promoted to the next room above, where they were not treated as an unusual problem; consequently, constructive work was omitted, as it must necessarily prove a tax on the teacher's time and pocket. A few weeks later found Frank absent. When asked about him, one of the boys said, "I saw him on the lot the other day. He says he isn't coming to school any more." Here was a bit of school experimentation, but its value was lost on account of the inflexibility of school organization. It did not fit into the system.

Much of our educational procedure has come down to us from periods following the Renaissance, when en-

thusiasm for knowledge as information disturbed the mental perspective and prevented educators from getting an adequate estimate of proportional values in the educative process. The overbalanced regard for the number of pages gone over in the text-book—the subordination of quality of achievement to quantity of information—and much of the method of the recitation are a legacy of this earlier distortion of ideas.

We have now reached a point in educational enlightenment where opposition to the scientific method must be frankly pronounced a prejudice. Those who entertain it cannot be expected to comprehend a new mode of procedure unless it be self-evolved; and this prejudice debars them from fairly testing what others declare good, because through expecting failure in it they will fail. It is rather singular that the experimental method, welcomed in other fields as evidence of progress, has received such scant courtesy in education. Education, no doubt, must be conservative, but when conservatism opposes investigations and comparative trials under controlled conditions previously determined it is mere inertia. Every argument for conservatism in teaching applies equally to surgery, and yet by seizing scientific principles of change in methods the progress of surgery during the last fifty years has been almost unparalleled and, it may be added, the beginning of its progress dates from its renouncement of the traditional idea that reason without experiment is a sufficient guide.

The writer is aware that much of what is best in teaching is received through the personal impress of those whose inspiration gives inimitable delicacy to the contact. But, after admitting all that may be claimed

by the advocates of native aptitude, there still remains a wilderness of wide extent through whose trackless maze intuitions are but a capricious guide. It is rather in the manner of executing the plan approved by experiment that the superior efficacy of the born teacher appears.

At the request of the writer, Mr. William W. Hall, teacher of Spanish in the Yeatman High School of St. Louis, began a series of tests with two of his classes. The tests were given regularly on the same day of each week, and were intended primarily to measure the progress of the pupils and to find the curve of learning for one school subject under the natural conditions of the class-room.

These tests, which were given every Tuesday, consisted each time of one hundred words, fifty per cent. of which were new words and phrases, and fifty per cent. old words in new combinations. The time allowed for each test was thirty minutes, and at the expiration of that time the papers were laid aside for collection. The sentences which composed the tests were prepared with great care in advance of the recitation and were dictated to the class in English and written directly into Spanish. As soon as every pupil had finished one sentence the next was dictated. The sentences were so constructed that there were exactly one hundred possible errors in each test, and the two classes had been at work one week before the first test was given. Effort was made to note all conditions that might affect the progress, but none were discovered except such as might be expected from time to time among high-school children. The classes were conducted in the usual manner, and the pupils were not

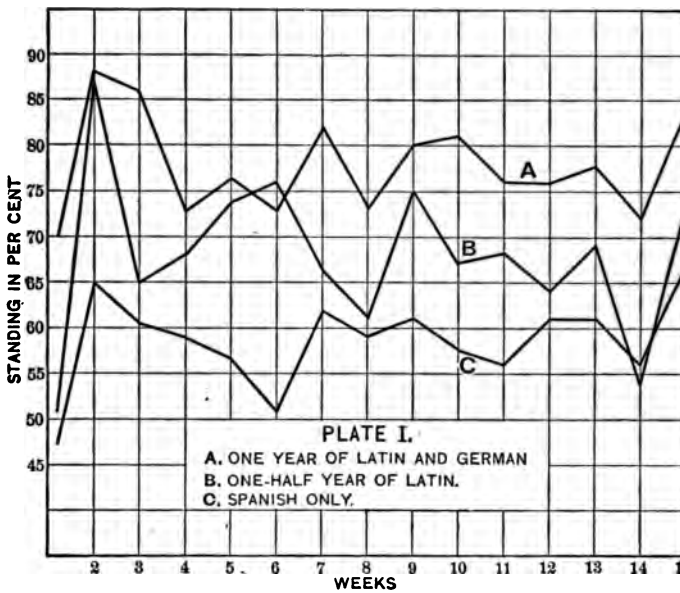
aware that any use beyond that of grading was to be made of the results of the tests. Written exercises of this sort were so frequent in the school as to prevent any special comment. Indeed, the same weekly test had been the custom during the preceding year, though at that time no special use had been made of the results. The papers were corrected without delay, and were returned to the pupils on the following day with their valuation. This kept the interest of the class keen and contributed to the success and accuracy of the investigation; for the hope of excelling his previous record spurred every pupil to his maximum effort at each test. That this was true was shown by the eagerness of all to learn each time whether they had improved on their previous record. Two classes were included in the investigation, one composed of fourteen boys and fourteen girls, and the other of ten boys and ten girls, and one class recited in the morning and the other in the afternoon.

As some of the pupils had never studied any foreign language before entering these Spanish classes, it seemed best, in tracing the curves, to separate them into (1) those who had previously had a year of Latin, (2) those who had already studied Latin and German for a year, and (3) those who had never before studied any foreign language. It was also decided to draw separate curves for the boys and girls.

As frequently happens in experimental work, suggestions were obtained in lines other than those that prompted the investigation. The separation of those who had previously studied one or more foreign languages from those who had not at once raised the question of the advantage of these languages in the

subsequent study of Spanish, and the indications afforded by the progress of the pupils during the period of the test will be considered in the discussion of the curves of learning plotted from the weekly tests of the several groups.

The tests were continued for fifteen weeks, which are

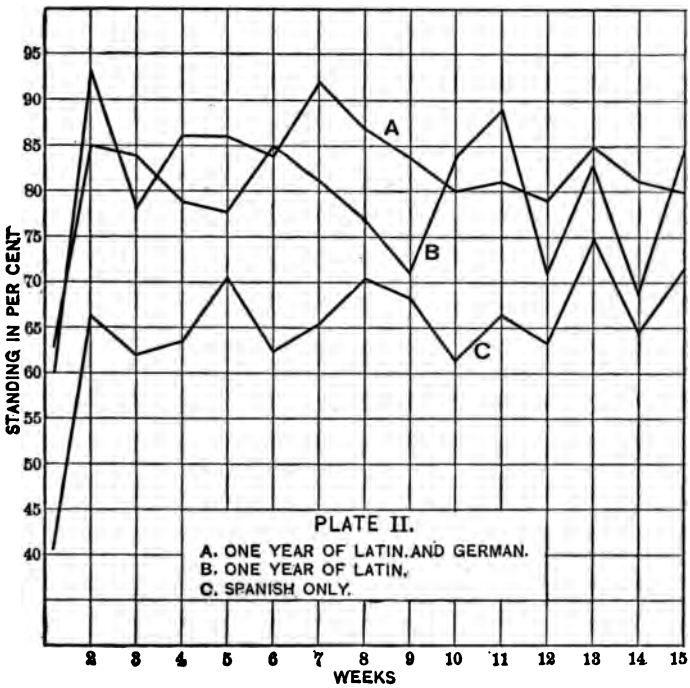


severally indicated on the horizontal line below the curves that follow, while the relative standings of the pupils in percentages are shown to the left of the vertical line.

Latin, because of its developed grammatical structure, has long been thought to give its students unusual language discipline, and the curves of the several groups

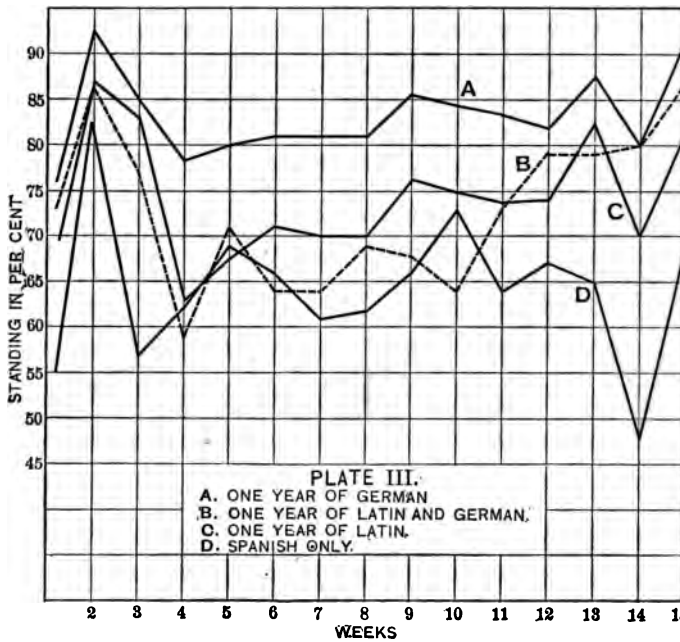
were first studied in the hope of obtaining some information concerning this much debated question.

It will be seen from the curves of Plates I and II that those who had studied Latin shot rapidly ahead of those who were beginning their first foreign language,



but in Plate III the curve of two girls of about the same average ability as the others, who had studied only German before beginning Spanish, is well above the curve of the three girls of certainly not less language ability, as their teacher, Mr. Hall, informs me, who

began Spanish with a year of Latin to their credit. But further, in addition to the fact that the curves of the several groups shown in Plate III do not sustain the belief in the superiority of Latin over German as a means of language discipline, the curves of the groups represented in Plates I and II indicate that the ad-



vantage afforded at the start by the previous study of other languages is not always maintained. These curves tend gradually to approach one another, and this would seem to show that in the fifteen weeks during which the tests were continued, some of the momentum given by the earlier study of other languages is lost.

In the class represented by Plate I, the curve for the boys who had never before studied a foreign language (Curve C) shows a gradual ascent. After the sixth week they improve noticeably and maintain this higher level to the end of the investigation. Curve B, on the other hand, representing the progress of a boy who started with the advantage of half a year of Latin, drops perceptibly during the same period, while the three boys who had had a year both of Latin and German (Curve A) hardly more than hold their own. It is certainly suggestive that the boys who were beginning their first foreign language (Curve C) were the only ones who at any later time during the fifteen weeks' test equalled their record of the second week. When the experiment ended they were at their highest average.

The writer's studies in the psychology of learning have demonstrated that there is always a rapid initial rise, which later is equalled only after a good deal of work. The length of time needed to make the same record varies with individuals and with different subjects of study, but never in the course of fifteen weeks to reach again the high mark attained earlier in the work, as was the case with the boy who had studied Latin for half a year, as well as with the three who had had a year of both Latin and German, does not argue strongly for a general "language discipline." It will also be observed that these two groups (Curves A and B) scored their lowest record during the next to the last week, an unfavorable omen at that stage of the work, and especially so when we remember that all of the boys of the three groups whose progress is represented in these three curves (Plate I) were in the same class and were taking the same tests.

Turning to Plate II, if the progress of the seven boys with whom Spanish was the first foreign language (Curve C) is less marked than in the corresponding curve of the class shown in Plate I, there is, nevertheless, a clear rise toward the end of the work, while the other two groups either drop slightly, as in the case of the one girl who had had a year of Latin and one-half year of German (Curve A), or, as with the one Latin boy, barely hold the former level. Here, again, the curve for the Spanish group reaches its highest level during the latter part of the period and closes on a higher level, compared with the previous records, than either of the other curves. None of these differences, in the opinion of the teacher in charge, could be accounted for by differences in the ability of the pupils.

In the class shown in Plate III, there was only one girl who had never studied any other foreign language before entering the Spanish class, and she was between nineteen and twenty years of age when admitted to the high school. As her classmates entered at the usual high school age, she worked under the disadvantage of being past the age favorable to remembering rules and declensions. The two girls who had already had a year of German (Curve A), the three who had studied Latin for a year (Curve C), and the one who had given a year to both Latin and German (Curve B), were of about the same average ability, as nearly as their teacher could determine, and all of them were superior, intellectually, to the one who was beginning her first foreign language with this class (Curve D). These individual differences should be considered in comparing the curves. This class was composed entirely of girls.

The number included in these tests was too small

to serve as a basis for anything more than tentative conclusions, but the results certainly open the question whether the advantage to beginners of a new language, so generally thought to accrue from the study of Latin, may not be due, chiefly if not solely, to grammatical information that would be carried over from one language to another, and which would naturally help enormously at the start. In acquiring facility in the use of the Spanish gender, to cite one example, Latin would aid materially, since the majority of Latin feminines are feminine in Spanish, and a large part of Latin masculines and neuters become masculine in Spanish. The declension of Spanish adjectives for gender and number, and their agreement, in these respects, with their nouns, would give Latin students a further advantage. The teacher of the Spanish classes noted that more frequent and detailed explanations of case were needed by those who had not studied Latin. The order of words, also, was more readily mastered by those familiar with the Latin arrangement. Finally, in learning the conjugations and in understanding the significance of tenses, the assistance of the information acquired under these topics in Latin was found to be especially great. It cannot be doubted that the substance of information carried over from Latin or German would give beginners in a new foreign language a decided lead over classmates who were receiving their first introduction to work of this sort. Whether they would continue to hold the higher level at which they started, or whether, after the others had mastered the information with which the former began, the curves of progress of these different groups would come together, cannot be determined from this experiment.

To decide this, the tests should have been continued throughout the year. The indications, however, are that the higher records made by the Latin and German pupils were the result of the substance of language information obtained from these studies rather than of any so-called "language" or "mental discipline."

The purpose of this investigation was to demonstrate the possibility of subjecting such questions to the test of class-room experiment. Much has been said in the past about "formal training," and indeed such mysterious phrases as "mental discipline" and "training the mental faculties" have long been such effective pedagogical slogans that it has been thought unnecessary to expose them to the ordeal of experimental proof. Thorndike and Woodword, however, concluded from their investigation that "there is no reason to suppose that any general change occurs corresponding to the words 'improvement of the attention,' or 'of the power of observation,' or of 'accuracy.'" [1] Indeed, they go still farther and hold that not only may improvement in any single mental function not improve the ability in functions commonly called by the same name, but it may even injure it.[2]

Mr. Hall's work shows that the application of the scientific method to questions of this sort is entirely practicable. To give validity to the results, however, the number of pupils taking part in the test should be much greater, and the investigation extended to at least a year; but the amount of work involved in such experiments forbids that they be carried out by public

[1] "The Influence of Improvement in one Mental Function upon the Efficiency of other Functions," *Psychological Review*, Vol. VIII, 1901, p. 249.

[2] *Ibid.*, p. 250.

school teachers. Here is a rich field for pedagogical research in teachers' colleges. Experimental schools should be established by them, the aim of which should be to solve educational questions that lend themselves to the experimental method, and there are many problems of that nature.

Some years ago an experiment that was being made in the Pueblo (Colorado) High School was attracting the attention of progressive schoolmen throughout the country. Since that time the results of the experiment have been published in *An Ideal School*.[1] Twenty pupils composing a Cæsar class varied in working ability from forty units to one hundred and forty.[2] Later, in a Holyoke (Mass.) grammar school, in an arithmetic class [3] nearly ready for the high school, Mr. Search found a difference of from one hundred and forty to four hundred and seventy-nine units in work-producing capacity; and in a Leominster (Mass.) geometry class [4] of twenty-six the variation in ability ranged from forty units of work to one hundred and sixty-eight. These figures win added significance when it is remembered that the question here is not one of mental defectives, but represents what is probably a fair average of the difference in work-producing capacity of the pupils in well-graded schools.

A few years ago Mr. Gilbert B. Morrison, at that time principal of the Kansas City (Mo.) Manual Training High School, conscious of the great variation in working power of high-school pupils, gave his teachers permission to try the "individual," or "laboratory method,"

[1] By Preston W. Search.
[2] *Ibid.*, p. 29.
[3] *Loc. cit.*, p. 33.
[4] *Loc. cit.*, p. 168.

if they desired. By this method, as suggested by Mr. Search, each pupil advances at his own pace, and it is found that the more able and proficient accomplish considerably more than would be possible with the "class-recitation" method, while the least capable do not cover so much ground, but, in compensation for this, it is claimed that, as far as they go, they master the subject more thoroughly. Mr. Morrison has reported [1] the results obtained in a variety of subjects.

"The 'bad boy' was conspicuously absent from the algebra and geometry classes as soon as the 'individual method' was adopted, and if there were any strained relations between teacher and pupil they died out," was the statement of the master in charge of these subjects. "That tension of nerve and feeling, indescribable but real, which every teacher must at some time have felt and longed to be relieved of, practically disappeared."

The history teacher found that the arrangement "made it possible for pupils, who under the old plan would have dragged through the year and failed on the entire work, to make a creditable grade in ancient history."

In German, two bright girls finished the prescribed work a term in advance of their class, and in doing this acquired a feeling of confidence in their own power that encouraged them to begin French by themselves.

The success of this method in the Kansas City Manual Training School was so striking that Mr. Morrison was encouraged to give permission to the teachers of the McKinley High School in St. Louis, where he is

[1] *Proceedings and Addresses of the Forty-second Annual Session of the Missouri State Teachers' Association*, 1905, p. 63.

now located, to try it if they wished to do so. The work of two of the algebra classes in which it was used deserves special mention because the result was tested by a competitive examination with two other classes of no less ability, and taught by equally good teachers. Those who had worked by the "individual" method showed a distinctly better grasp of the subject. The conclusion was so evident that the teachers, who up to that time had followed the old method of class recitation, decided to adopt the new plan. In his estimate of the effect of the "individual" method, as he has observed it, Mr. Morrison reports that "the pupils say they have more time to think and have a better opportunity to make their difficulties known to the teacher. They do not show the weariness at the close of the day that they do when they recite continually. The percentage of failures is considerably less than before, and many of the teachers who feared the results say that the practice has taught them something about teaching, and they know their pupils better than they otherwise would." [1] With dull and bright pupils alike, the quality of the work, in Principal Morrison's opinion, has been very greatly improved.

The number of times per week that a class may most advantageously meet has also been suggested for experimental solution by the work of Search and Morrison. Do five recitations per week bring better results than three? The writer found a surprising gain in ability to keep two balls going with one hand, receiving and throwing one while the other was in the air, during monthly intermissions of practice. These

[1] *Proceedings and Addresses of the Forty-fourth Annual Session of the Missouri State Teachers' Association*, 1905, p. 64.

tests were made by three men and occurred every thirtieth day during five months. To test the question further, the same experiment was repeated [1] by two of the three after a lapse of six hundred and forty-two days from the last monthly test, and the score indicated an increase in skill beyond that which had been acquired at the completion of the earlier regular practice, when the experimenters were fresh from the work. A similar gain in facility in typewriting [2] was also found by the writer two years and thirty-five days after he had completed his investigation of this learning process. During the intervening time there had been no practice of any sort in either of these acts of skill. Bourdon [3] has observed the same persistence of memory and improvement in function in various mental processes. The question is one of immense educational importance, and its investigation should be continued until its significance for the various levels of study has been determined. Observation of the effect of the "individual" method has led Principal Morrison to the conclusion [4] that the efficiency of high-school teaching may be greatly increased by placing studies on alternate days and lengthening the class periods.

College teachers who become well enough acquainted with their students to learn their feelings, often hear the complaint that they have no time to think. They must continually grind, they say, and the significance of this remark becomes clearer from the fact that it is

[1] *American Journal of Psychology*, Vol. XVI, p. 131.
[2] *The Psychological Bulletin*, Vol. III, p. 185.
[3] *L'Année Psychologique*, Vol. VIII, p. 327.
[4] *Proceedings and Addresses of the Forty-second Annual Session of the Missouri State Teachers' Association*, Dec. 29–31, 1903, p. 73.

always the best students who make it. Is it not possible that, in our enthusiasm for scholastic attainment, we have over-emphasized the information factor? In the light of the fragmentary experiments in subconscious mental activity thus far made, it is entirely conceivable that we are working against unnecessary friction-resistance in the extravagant idolatry of continuous instruction through books and lectures. Mentality may not make its best growth in this way. Arrest is quite as likely to be caused by overfeeding as by starvation. Spontaneity and versatility are not the least of the educational desiderata, and they are not furthered by the monotony of continual grinding. Occasional days without text-book or lecture assignment, with one or two illuminating questions, suggested by the work of the course, but free from severely scientific accretions, announced for discussion, would help enormously to put meaning into studies that too frequently have little significance for the learner beyond their scientific aspects or the correct solution of problems which are often far away from the life of pupil and student.

The disastrous effect of determining the quantity of assignment by what can be accomplished by the best students, or by the mythical average, which impressed Search and Morrison, has been observed at West Point. "Heretofore," wrote one of the officers of instruction in a personal communication, "under the plea of mental gymnastics and in order to accomplish a complete course, the lower men have been dragged along at a pace beyond their powers, with the result that, instead of having a sound practical working mastery of the elements, they have had a more or less confused and feeble comprehension of an advanced course beyond

their needs, and have been left in a state of mental dyspepsia and exhaustion as injurious as it is wasteful of time and effort." At West Point they are now meeting this difficulty by grading the cadets with severe accuracy, and the sections containing the weaker students omit portions of the work taken by the better ones, the omissions being more frequent as they descend in the scale of ability, and, in addition, those of superior power—the upper sections—continue the work beyond the point at which the others stop.

In order to find out as nearly as possible what may be regarded as the minimum individual variation in ability of students in exceptionally well-graded classes, the writer consulted the standings of the members of the graduating classes of the United States Military Academy at West Point and the Naval Academy at Annapolis, for the years 1904 and 1905. Subjects of study vital to a successful military and naval career were selected, and the grades of the highest and lowest in these several subjects were ascertained from the official registers for the years considered. With these it was thought best to include English. As the Naval Academy does not publish a separate standing for English, this could not be included in Table II. The register for 1905, however, contains the marks of the class in languages, and they will be found with the others below. All of the standings have been computed on the basis of 100 per cent. for perfect standing. There were 124 students in the class of 1904 at West Point, and 114 in the class of 1905, while the corresponding classes of the Naval Academy contained 47 and 62 respectively.

TABLE I

UNITED STATES MILITARY ACADEMY

Subjects of Study	CLASS OF 1904		CLASS OF 1905	
	Highest	Lowest	Highest	Lowest
Practical Military Engineering	99.88	83.80	99.28	75.93
Civil and Military Engineering	100.	70.38	99.79	68.45
English	100.	67.54	99.38	70.60
Mathematics	99.72	63.95	99.98	68.14

TABLE II

UNITED STATES NAVAL ACADEMY

Subjects of Study	CLASS OF 1904		CLASS OF 1905	
	Highest	Lowest	Highest	Lowest
Physics	96.75	58.	95.29	65.50
Navigation	91.50	55.75	96.	62.50
Languages	—	—	100.	64.50

In the West Point Military Academy in 1904, as will be seen from Table I, the best students in practical military engineering received 99.88 per cent., and the lowest, 83.80 per cent. In 1905, the variation was increased from 75.93 per cent. for the lowest to 99.28 for the highest. In civil and military engineering the corresponding range in 1904 was 100 per cent. for the best and 70.38 for the poorest, and in 1905 the difference in the same subject varied from 99.79 to 68.45 per cent. In mathematics the extremes were 99.72 per cent. and 63.95, in 1904, with 99.98 and 68.14 in 1905. In English, the best and lowest for 1904 were 100 and 67.54 respectively, while in 1905, the corresponding standings were 99.38 and 70.60. It goes without saying that in all of these cases only those who passed the final examination for graduation were included in the statistics.

At West Point absolutely no consideration is shown to those who cannot or do not do the work. This makes these figures unusually instructive. It is strictly a question of ability in the subjects of the curriculum. The writer is assured by graduates of the institution that all of the students work to the utmost limit of their ability. "Our purposes are so well defined and our proficiency standards are necessarily so rigid," continued the officer mentioned above, "that study must be severe and unremitting throughout the class. We have the pressure of the entire nation behind us in enforcing our requirements, besides the prize of a commission, both of which contribute to produce a tremendous coercive force. There is no loafing at West Point. As to marks, we are more thorough in the application of the marking system than any other in-

stitution of which I know, except, perhaps, Annapolis. We have to do this to insure accurate grading for graduation standards. I suppose it is the best artificial scheme which can be devised for determining relative degrees of proficiency."

In the Naval Academy, as Table II shows, the highest in physics in the class of 1904 received a mark of 96.75 per cent. and the lowest 58, while in navigation the variation was 91.50 and 55.75 for the same year. In 1905, the range in physics was 95.29 for the highest and 65.50 for the lowest, and in navigation it was 96 per cent. and 62.50. In languages the difference for this year was 100 per cent. for the best and 64.50 for the lowest. The grades of graduates of these two institutions may, in the opinion of the writer, be taken as the average minimum of individual variation for the number of students in the several classes.

These figures, of course, have only relative value, but that is what gives them their importance. After the elimination of the preceding years and that of the final examination—and in no other educational institution in the country is it even approximately so severe—this wide difference in ability must be tolerated to meet the needs of the army and navy. This is certainly very significant. If such variation in mental capacity exists among a body of picked students, how much greater must be the extremes in public elementary and secondary schools, where the selection is necessarily incomparably more relenting? It throws wide open the whole question of the method of the recitation and makes imperative its experimental investigation.

Again, the time for beginning the various studies of

the elementary and secondary schools has received little attention other than theoretical. It is now known that there are periods in the lives of children when their minds crave certain kinds of activity. This may be a phase of the fact previously mentioned that both the body and mind mature in sections instead of developing evenly. There is a time when children want to draw pictures (the pictorial stage), to read adventures (the beginning of the historical interest), to read literature of various kinds, to criticise and debate (the interest in questions of logic), and to study machinery and invent (the scientific interest). These nascent periods are the psychological moment for the several lines of work. If struck at white heat, the mind begins a new growth, attacking and assimilating ideas with keen avidity, and the mentality acquires a new and permanent bent, culminating in an interest very different from the artificial adhesion which teachers usually seek to attach by various devices which are thought to create a liking for the subject. Instead of suppressing these seemingly erratic outbursts, the schools should make them their allies in the development of children. These nascencies are not rigid developmental events occurring at definite ages. They are features of individual psychology and furnish further evidence against the customary manner of grading and the "even front" shibboleth of schoolmen. Education can never accomplish its best until the mass method of training has been relegated to pedagogical tradition with other educational lore. This individual factor in education is the element of success in the Princeton tutorial system, and the "personal touch" of the preceptors reveals the lost opportunity of professors im-

mersed in the mediæval system of lectures and the traditional aloofness of scholastic dignity.

Grammar in the grades is the bane alike of teacher and pupil, yet no serious attempt has been made, outside of committee rooms and teachers' meetings, to decide when it may begin most profitably. Impressed by the generally observed deficiency in this subject, the framers of curriculums think it should come early in the course, that it may be given plenty of time, and so formal grammar is often begun before the teens. Now grammar is elementary logic, and for this reason the time when it could be most effectively studied would seem to be during the "critical," "debating period," *i. e.*, during the high-school course. A high-school principal recently told the writer that an experiment extending over three years had convinced him that he could teach his third-year pupils more grammar in six weeks than they had acquired in all their previous study of the subject, and this was as true of those who had not taken Latin as of those who had. One man's experiment in a matter of this sort may not afford conclusive proof, but it certainly suggests a profitable line of investigation, and it is the disregard of the investigating method, so general among educationists, that has caused the reports of their committees to be treated with scant courtesy by scientific men.

It is almost certain that modern languages are begun too late. In Germany, American children from seven to ten years of age learn to speak the language with a fluency and accuracy far superior to that of boys above fourteen, and that, too, in a fraction of the time. Would it not be advantageous to begin

French and German by the conversational method early in the grades? Experiment only can settle this question. It is entirely possible that utilization of nascent periods may save time enough to meet the needs felt for subjects now largely crowded out of the public school curriculum.

The logical order of sequence is not necessarily the pedagogical, nor is the importance of a study a valid reason for introducing it before the fulness of time. Here is an almost inexhaustible mine for experimental investigation. Arithmetic receives from one-third to one-half more time than any other subject in the elementary course—in some schools it is given as much time during the eight years as any other two subjects, and yet it is a common experience of teachers to find classes that ranked from 85 to 100 per cent., when taking it in regular course, drop to 25 or 35 per cent. the following year, when reviewing the same work. Why not start classes of fairly equal ability at different ages under the same teacher, and see whether the results are sufficiently decisive to determine the nascent period for this subject, so far at least as general psychology can serve as a guide? This would furnish an experimental starting point for individual variation. Several Missouri schools are trying the plan of cutting out large sections of arithmetic in the seventh and eighth grades, and in its place substituting elementary algebra. The more advanced topics in arithmetic are then taken up in the senior year of the high school, when increased mental maturity enables the pupils to do the work in much less time and with greater comprehension and enjoyment. Under this plan all problems capable of algebraic statement, and other more difficult topics, are

omitted in the grades, and so many of them as seem essential are taken up in the high school.

Dr. J. M. Rice tested 6,000 children in arithmetic, and, finding the usual appalling deficiency, concluded that "the controlling factor in the accomplishment of results is to be found in the system of examinations employed, some systems leading to better results than others." [1] One is reminded of the man who ate a midnight luncheon of lobster *à la Newburg* with raw tomatoes, hot Welsh rarebit, English plum pudding, hot mince pie, Roquefort cheese with crackers, and a bottle of champagne. When his doctor was leaving the next morning, the patient, after a night of exquisite agony, turned his face to the wall with the remark that raw tomatoes never did agree with him anyhow, and he would never again touch the "pesky" things.

Whatever may be said of the benefit of collecting and summarizing one's thoughts concerning a given topic and putting them on paper, examinations have long been a kind of pedagogical cudgel held threateningly over youthful searchers for light. Written work as a means of educational growth, and examinations as a basis for grading, are two different ideas, though they are often confusedly intermingled in the argument. The value of the first no one would be inclined to deny, but the second is at least questionable. As was shown in a preceding chapter, a student with strong visual brain can commit pages to memory in a night of cramming, and pass a more brilliant examination than another greatly his superior in thinking power and grasp of the subject, but weaker in mental visualization. Examinations, then, will rank the abler man below the

[1] *Forum*, Vol. XXXIV, p. 444.

shallow crammer. No one has been connected with schools and universities as student or instructor without seeing this happen in cases without number. A right comprehension of brain nature and brain processes demands the abolition of examinations. They are the weapon of the weak teacher for forcing the student to do the work that the teacher's intelligence and inspiration should bring about. But they really do not have this desired effect, for the students defend themselves against it by preparing merely for the examination. The true work they omit. If they knew that every day was contributing decisively to the estimate of them, and that there would be no examinations to redeem their failures here, they would do real instead of examination work. But the inadequacy of examinations does not end with this, since there are others who for very different reasons do not show their knowledge by such tests. Lobsien [1] investigated the effect of the examination-consciousness on the ability of fifty-four eight-year-old boys to work on paper moderately difficult examples in arithmetic, and found that the children made more mistakes and did not accomplish so much as they did when they knew that the results were not to be used in determining their standings. As a result of his investigation he concluded that examinations never show the ability of children. Their continued popularity rests on the force of tradition and imitation, as well as on the fact that they offer the inducement of least resistance. Facts—mere information—seem made for ease in questioning and lend themselves with facility to accuracy in marking and, in addition, they enable uninspiring teachers to force a semblance of attention

[1] *Die Experimentelle Pädagogik*, Vol. I, p. 30.

to the work. In many schools that prepare for college or state examinations, the pressure to put their pupils through converts education into an examination-machine practice. This perversion of the educational ideal is the cause of much of the averred insufficiency of high-school training.

Self-government among boys has already received considerable experimental attention.[1] The difficulty here is the difference in the personality of the teachers. Under a Thomas Arnold a benevolent monarchy accomplishes results that the best system of pupil government fails to secure under a less inspiring teacher. The failure to secure results with a given method does not necessarily prove the worthlessness of the plan. If one of two schools under different forms of government is permeated with an *esprit de corps* that makes dishonorable conduct among the pupils impossible, and the other is conspicuous for cheating and other forms of conduct recognized as dishonorable, the fault in the latter instance may lie in the plan of the management or with the teacher in control, or with both. Disagreement concerning experimental school government arises chiefly from the varying conditions under which the experiments are made. But if this is the cause of indefiniteness during the early experimental stage, it is also the justification of the experimental method, since this alone gives a reasonable basis for the elimination of incapable teachers. The difficulty in distinguishing be-

[1] *Seventh Annual Report of the New York City Superintendent of Schools*, p. 451. Max B. Thrasher: "A Government of Boys, for Boys, by Boys," *New England Magazine*, Vol. XXII, 1900, p. 193. C. W. French: "School Government," *School Review*, Vol. VI, 1898, p. 36. John R. Commons, *American Journal of Sociology*, Vol. III, p. 439. *Report of the U. S. Commissioner of Education*, 1901, Vol. I, p. 235. Various Reports of the Farm School, Thompson's Island, and of Boyville, Cleveland, O.

tween good teachers and poor ones is the lack of a standard of criticism and judgment. So long as physical force and punishment were permissible, uninteresting teachers, if sufficiently forceful, could still maintain a semblance of tranquillity. If the repressed forces occasionally erupted, the cause was ascribed to the innate wickedness of boys, and coercion and repression were applied at the exposed danger point until quiet was restored. The disfavor into which corporal punishment has fallen makes it difficult for those who are incompetent to keep eruptions under restraint. The view that incapacity of teachers is more responsible for school disorders than original sin inherent in children is steadily gaining ground. The Juvenile Courts, under the control of men who understand boy nature, have given convincing arguments. When a judge can remove [1] policemen from the most disorderly section of a city and put in charge of preserving order the very boys who have been the cause of the disturbances, advocates of coercion and repression have quaking ground on which to stand.

Superiority to investigation and experiment, forced by progress in the several sciences to retire from one position after another, is making its last stand in the field of education. The chief difficulty in driving it from its present vantage ground is the mystic potency of "experience." There is probably no other word that lends itself to juggling with such charming edification and mystification of both the juggler and his audience. Its very utterance with proper unction is by many thought sufficient to subdue any demand for

[1] See Lincoln Steffens's paper in *McClure's Magazine*, October, 1906, pp. 574-575.

proof of its oracular deliverances. The effect of experience is always relative. Its teachings vary with the ability of the individual to interpret correctly the elements that enter into situations. Naturally, its counsel is diverse. Just why education differs from other branches of knowledge in dispensing with the preliminary steps of investigation and experimentation, and in disclosing its innermost secrets to its prophets by a sort of immediate perception has never been shown. The poorest teachers are not necessarily the youngest, nor may we always point to those who have reached the meridian of life as models of excellence. In teaching it is usually quantitative experience, instead of qualitative, that receives the highest mark.

Certainly no one would wish to underestimate the value of the native insight into the needs of children shown by the born teacher, but to deny the importance of the investigation of the facts of child life, because a few understand them intuitively, would be as unscientific as to maintain that psychology is unnecessary for men primarily concerned with human actions, because the untaught Shakespeare wrote plays from which psychologists continue to draw illustrations. The great mass of teachers do not possess this intuitive insight, and their work must rest on intellectual conclusions consciously acquired. Acceptance of word-formulas without ascertaining by investigation and experiment whether there is any truth in them has preceded the scientific method in all branches of knowledge, and education is still greatly controlled by this occult process. During the last decade much information has been gathered, but it has not permeated education be-

cause of the curious feeling that this subject cannot be approached from the scientific side.

It is partly because of the tyranny of "experience," and consequent suppression of the scientific spirit, that teachers have been such easy victims of cheap pedagogical literature. Probably no other class of intelligent people has ever been written down to in the same humiliating way. It seems to have been assumed that everything must be diluted and strained, and strained and diluted again, lest by chance some solid particles of virile thought go through the filter and find lodgment in the mind of the readers. Teachers have had their own books on psychology—usually written by men who knew little of the subject, but who had acquired the art of saying commonplace things in an imposing way. Most of the books on pedagogy that were not platitudinous were labored attempts at describing the mental processes of children in formal terms by analysis of the adult mind. Little else could be expected so long as the antiquated notion prevailed that knowledge of the processes of child development could be intuitively absorbed from uncriticised and unorganized experience. The application to pedagogy of the scientific method of research and experimentation is already evident in its literature. That this change has so little effect upon the schools, while mainly the fault of educators, is not wholly so. The people often turn over the management of their schools to boards who use them for their own enrichment or run them as political machines. The efforts of superintendents to improve the nature of the instruction are met with protests against additional expense and higher taxes, and if this does not quite blind the people to the right of

their children to the best that educational thought of the day can offer, the cry of "fad" is usually a convincing argument, though what dreadful scourge a "fad" may bring, only the interested politicians can tell. So great an influence may a word of mysterious emptiness wield.

Few superintendents are willing to face the issue squarely. And yet when the choice between good schools—and this implies much more than good instruction—and poor ones is clearly set before the people their support is usually decisive. Educators, however, must take the public into their confidence and show what good education means. Civic indifference to educational progress is due to the engrossment of the people in other things, and to lack of time and opportunity to keep up with the movement.

Experiments are of service in education for the same reason as in other branches of knowledge. They force one to face squarely the conditions of the situation under discussion. The relative significance of the various factors that go to make up an experience can only be determined by the process of elimination. Uncontrolled conditions are usually too complex for theoretical analysis. The scientific method simplifies the situation so far as possible, and takes accurate cognizance of the factors involved, so as to separate the essential from the adventitious and to ascertain the part played by each necessary element. Unregulated observation is too greatly influenced by the personal equation to give validity to its judgments. This is particularly true of education, because of the petty annoyances of the school-room. Extraneous factors, resulting many times from the ill-health or incompetence of teachers, are enormously exaggerated, and the essential elements are

so grotesquely distorted that the view obtained is a perverted representation of the situation. It cannot well be otherwise so long as the personal experience of teachers who are worn out by the strain of the schoolroom forms the basis of educational policy. Matters are not much improved when the superintendent's office is the power-house. In the United States, at least, the function of the superintendent is becoming more and more that of the diplomat. Desire to hold his position puts him under continual pressure to inquire what he *may* do rather than to search out what he *should* do. He is the follower of what he thinks is the safe course, and invariably this is disastrous to progressive thinking. The habit of shaping utterances and actions with reference to keeping a position gradually deprives one of the power to form independent opinions.

Thus far educational experiments have been too detached and fragmentary. The few who have undertaken them were already burdened with heavy work which occupied most of their day. This left little leisure or energy for working out details or for critical study of the results. In many instances lack of time forced the abandonment of the experiment before its completion. This is the result of the failure to appreciate the importance of the work. Education has been too absorbed in its history. Teachers are constantly straining their eyes by looking over their shoulders at Pestalozzi, Froebel, and Herbart instead of forward to new achievements. As a result, pedagogy is always on the defensive against the charge of vagarious romanticism and practical inadequacy.

The progress of the last twenty years in the phys-

iology and hygiene of growth and development has made it necessary to remap the field of educational forces. Racial and individual elements have been found to be essential factors in the equations, and the too general neglect of them in the past has introduced into the results a constant error. Economy of energy is quite as truly a problem for education as for mechanics. Efficiency, the ratio of useful work to the energy expended in accomplishing it, may be increased by lessening the resistance or by applying more power, and teachers have occupied themselves too exclusively with producing power. In the midst of children all aglow with enthusiasm for activity, they set themselves squarely against these racial impulses and apply more power until the weaker yields; and this they do because of fetichistic veneration for traditional ideals of school management. Experimentation will rejuvenate educational conduct by founding standards of efficiency on a growing knowledge of the relation of subjects of study, time of introduction, and manner of treatment, to the age and individual needs of the pupils.

The utilization of the streams of racial energy in generating power applicable to the interpretation of situations, and to control over them—for this measures one's accomplishments—is the fundamental educational problem. In doing this the racial energy that civilization and urban life have made non-productive becomes productive. The results obtained by Judge Lindsey and William R. George are not closed with the reformation of young criminals. These men succeed because they have thrown aside traditional standards of judgment and primitive ideas of authority, and made boy nature their starting point. They

have joined in a league with the boys on terms of equality.

The latent energy of nascent periods, of suggestion and imitation, has long been recognized, but this knowledge has been acted upon in a most desultory way. To organize these chaotic, opposing racial and cultural forces for physical and mental development is the work of the science of education. To accomplish this, the effective scientific method must replace the expensive method of following unorganized experience.

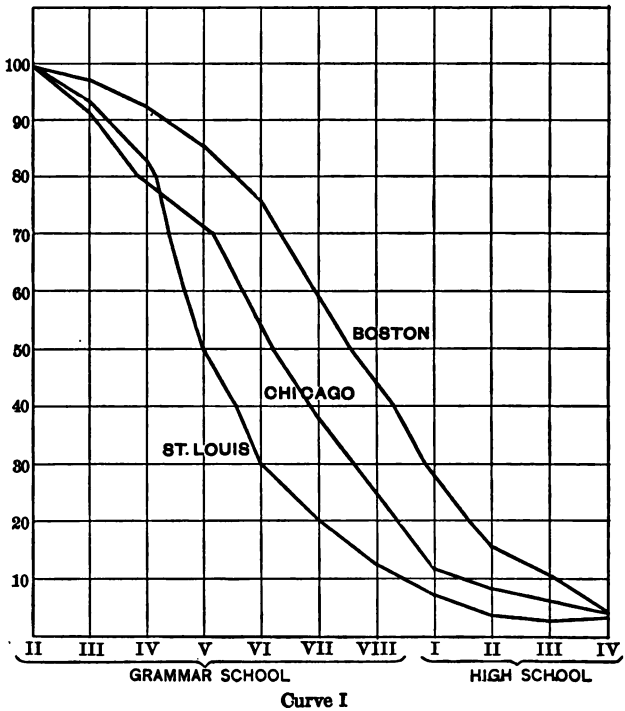
CHAPTER IX

SCHOOL-MASTERING EDUCATION

Probably in no other field of thought is there so much interest to-day as in education. After the reconstruction following the Renaissance, education looked upon its work and saw that it was good, and fell asleep. During the interim, educational writers have been chiefly occupied with repeating in weak phrases the ideas that thinkers put out in vigorous language, when education began to break away from mediævalism. A short time ago educationists awakened to this situation. The jolt that disturbed their slumbers was given by the industrial and commercial workers as they were moving past. Education was well in the rear before its priesthood became fully conscious of the ground they had lost, and in the scramble that followed great confusion prevailed, from which we have not yet recovered.

Education has been under especial fire recently. This was part of the general disturbance that awakened its leaders. Charges of insufficiency have been openly made and vigorously pushed. While some of the accusations made against the schools are founded on misapprehension, the indubitable fact remains that there is a factiousness in their organization and plan of

work that seriously detracts from their efficiency. The anxiety of children to quit school, and the evident willingness of their parents that they do so is an unanswerable indication of weakness. The first of the following curves,[1] traced by Prof. C. M. Woodward of Wash-

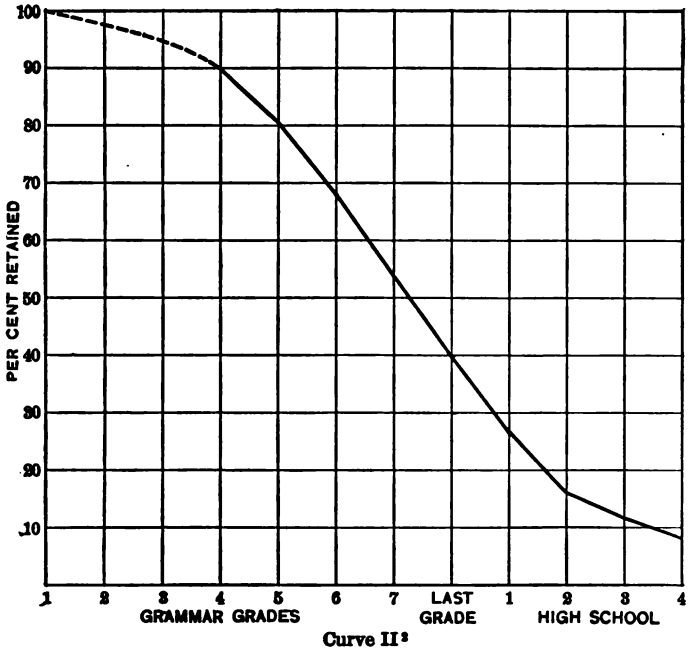


Curve I

ington University, shows the rate of withdrawal from the several grades and high-school classes, in Boston, Chicago and St. Louis, for 1900, or a little earlier.

[1] Report of the President of the St. Louis Board of Education, 1899-1900.

Book,[1] after correcting errors of earlier investigators, concludes that "making allowance for all corrections and setting the facts in their most favorable light, it still appears that more than half of those who ought to



Curve II[2]

[1] *Pedagogical Seminary*, Vol. XII, p. 239.

[2] Curve II was traced by Dr. Edward L. Thorndike and published in Bulletin No. 379 of the National Bureau of Education, which appeared as this book was going through the press. It represents the average elimination of pupils from school in American cities of 25,000 and over. The annual report of Andrew S. Draper, New York Commissioner of Education, has also just been issued. He finds that "not more than one-third of the children who enter our elementary schools ever finish, and that not one-half of them go beyond the fifth or sixth grade. It is hardly less surprising," he continues, "to find that only about one-third of the pupils who go to the high schools remain beyond the second year, and that only about one-sixth of those who enter remain to graduate."

complete a high-school course never enter a secondary school," and "of those who enter, only about twenty per cent. remain to complete the course." Truly, this is a very bad showing, but another fact makes it worse. Book also found from an investigation that included the high schools of Massachusetts, Rhode Island, New York, Indiana, Illinois, Missouri, Colorado, Montana, and Utah, that the graduates are chiefly girls. The proportion of boys to girls varies somewhat in different places, but it usually runs from one-third to one-fourth, and reaches even one-fifth. High-school principals thus find themselves in the curious situation of having their courses tabooed by the boys, for whom they are almost exclusively planned, and taken by girls to whose needs they are ill adapted. When we ask why boys leave the high school various reasons are given, the one perhaps most commonly offered being the desire to begin work. The causes we apprehend, may be placed under two main heads—the social and the strictly educational. We are required to consider the social here, in so far as they hinder education from accomplishing its work. The system of education might be made perfect in every respect and yet be a failure, if some other cause or causes prevented the great majority of youths from taking advantage of it. The country would then be but little better served by the brilliant system of education than if it had been a poor system, or even none, since so few would enjoy its advantages. The business of the educator is then not only to perfect his system, but, if it still fails to win the people, to find out why and to apply the remedy. For genuine education has grown to be a thing of predominant importance in the world; it is no longer the exercise of a

small class off in the nooks and corners of society. If democracies are to stand, it will be through the power and effect of popular education; the educators are not yet, but are to be, in a very important manner the preservers of society. And in this function a very decisive part of their work is to see that their education *reaches* society. Education is not *popular* unless the people get it. It is a contradiction in terms to speak about a popular education which does not spread thoroughly over the whole mass of the people. And only this genuinely popular education will uphold democracies. Therefore we venture to say that that educator is in these days a poor one who does not make the understanding of social forces a part of his equipment.

There are two great classes of those who withdraw from the schools,—the children of the poor who must go to work, and those who leave from loss of interest and discouragement. Improvement of the education given will reach the latter, but it will not touch the majority of the former—the poor. Of those who answered Book's *questionaire* the chief reason given for quitting the school was indifference resulting from loss of interest or discouragement. Some would probably allege this cause to obscure their poverty. But let us defer examining the effects of social poverty on education, and survey those elements in the nature of the education offered which drive children and youths, who might attend, out of the schools.

What underlies this loss of interest is, of course, not a simple question, but probably not the least important element is the fact that, in determining studies, and in deciding upon the manner in which they shall be taught, the criteria are almost wholly external to the

pupils. One cause of this is the influence of the college in its refusal to accept for entrance what has not been weighed in its scales. The high schools thus become valets of colleges, though only a small percentage of their pupils ever enter college, and those who do not, pay the penalty or leave the school. Most of them do the latter. The blame for the manner of teaching also belongs to the colleges. They must have something about which they can ask questions, and so, too commonly still, in English, historical references and philological details must be worked out and memorized, and everything must be outlined and analyzed and criticised and fossilized. In physics the causes of natural phenomena and the way in which machinery of various sorts works, in which boys are absorbingly interested, must yield to quantitative measurements for which they care nothing, because that is what university Ph.D's have been doing until they have come to think that the intellectual life is made up of amperes, volts, ohms, and watts. The fact that, in many high schools, college candidates and those who are not are taught in separate classes does not much alter the matter. The university spirit of measuring pervades the entire science work. Indeed, it is doubtful whether the same man can teach successfully in two widely different ways. The manager of one of the so-called dental colleges, abounding in cities, and in which cheap work is done, once told the writer that while all of his operators were graduates of regular dental colleges, and, in many instances, were, at graduation, among the best in their class, he always found that a year or two at work of a cheap grade unfitted them for work of a high order. He had found it necessary, he said, to keep two sets of

men, one for the cheap trade and another for good work. Evidently it is not a question of merely good and bad work, but rather of widely different ways of doing the same thing. It is a matter of physiological adaptation, of neural habit.

It may be said that unwillingness of boys to complete the public-school course does not prove that the schools are to blame. This may be true, yet such evident failure to satisfy the requirements of the situation indicates a real problem not to be lightly thrown aside. The purpose of the public schools is to educate the children ~~of the masses~~, and if they decline to accept education on our terms two courses are open to us: we may continue as before, piously regretting, of course, the inability of so many parents and children to understand what is for their good, as no doubt Lowell's learned chemist did when he found that celery, demonstrated by his painstaking investigations to be the best possible food for ducks, was almost the only thing "the derned things wouldn't touch"; or we may seriously take up the question from the standpoint of the children.

The feeling that education does not fit for life has become so general that teachers have been forced to recognize it. But this recognition has thus far only taken the form of introducing into the curriculum studies that are of immediate and direct utility in earning a living. Many of the commercial subjects are of this type, and manual training is taking on more and more of the trade-learning form. One of the causes of this is that which has usually determined the reception of an irresistible demand for educational reform—the inclination to follow lines of least resistance. Finding

it absolutely necessary to take some action, the easiest thing to do was to meet the new demands by a partial expedient. It has always been the tendency of educationists, like politicians, to resist reform until revolt has forced it upon them, and then, in yielding to the inevitable, to adopt the nearest apparent relief. The movement toward the practical, and even the trade-learning, as contrasted with the education it displaces, is a notable step in educational progress. It first of all crowds out the teaching of a mass of antiquated matter. It trains in and for action, and fits in a manner for actual life; since it leads to bread-winning it attaches some to the school for a longer time, and while there they imbibe other elements of education. Besides, some of the strictly commercial studies, if taught by a large-minded teacher, may be freighted with a good many allied values.

After saying all this in appreciation, it remains that immediate and direct commercial utility is not a satisfactory criterion of the educative value of subjects of study. Commerce has usurped a larger share of human life than belongs to it. It has crowded out much that is better than commerce, to the great hurt of human intelligence and character. It has turned most men into commercial specialists, and many of them, alas, into merely that. Had educators been alive to the real scope of their field this could not have happened. Educators acquiesced, and fell into the commercial procession behind the sharp commercialists. And now they are reduced to the position of begging of these commercialists for funds to conduct and advance education. The public schools, as specializers of children for commercial work, rather tend

School master 8.

to narrow their minds and confirm them in the conviction which fills the outer atmosphere, that commercialism is everything.

We set against this excess an idea of education that will correct the distorted estimate of commerce, by bringing before the young all the true values of life and drawing into activity all the rich powers of their natures. They would then go out into the world with such sane and complete demands on existence that they would spurn the starved thought and cramping life of the mere commercialist. To sum up, as commerce should be only an adjunct of broad life, so practical commercial teaching is properly only an adjunct of education, and its introduction into the schools cannot solve the problems we have raised. Nor does its presence in the courses retain in the schools the many children who require something besides "shop" education to kindle their interest. The attempt to popularize public education by this method can, therefore, give at best only imperfect success.

May it not be—and this is our view—that many of those who might continue, drop out of school early in their course because of the failure to make the pupils the starting point in deciding upon subjects of study and manner of treatment? These questions are usually settled in the office of the superintendent, and the basis of his decision is his idea of what the pupils' minds *ought* to be, not what they are.

Nascent periods, to which we have referred in the previous chapter, have been largely ignored. Instead of utilizing these flashes of racial life to kindle a natural enthusiasm, the schools have tried to create a supposititious interest, and when the pupils are found de-

ficient in certain subjects which are thought important, the solution usually offered is to introduce these studies earlier so as to give more of them. Yet, in spite of the attention given to English grammar, the complaint that children entering the high school have no grammatical "feeling" is not stilled, and an enormous expenditure of energy is required to awaken even a semblance of ardor for a variety of studies at the age when they are begun. The facts of mental growth accumulated in recent years by students of child development have made little headway against the authority of logical sequence.

In the manner of treatment of subject-matter there is the same servility to the fetich of logic. Subjects of study assume a certain logical form in the adult mind, and the inference that they must take the same form in all minds is thought axiomatic. Yet the order in which ideas first appear in immature minds may be very different from the order found by adult analysis. The letters of the alphabet are the elements of words which make up sentences, but it is a matter of common knowledge to-day that children do not naturally learn to read by the A-B-C method. Yet this undeniable proof that in some things, at least, children ignore details in reaching results—that they jump logical stages, make short cuts, and take in ideas as unanalyzed wholes—has not greatly affected the "method of the recitation"; and it is this that makes school life so different from the life of the outside world, into which the children soon must go. Indifference to nascent stages and slavery to logical order are very largely responsible, in the opinion of the writer, for the loss of interest, and discouragement of the pupils, so greatly lamented.

Here again the line of least resistance has been followed. Associative coöperation in the lives of the children, helping them to develop and get ideas in their own individual ways, is a very different problem from school-mastering.

It is not the teachers who are primarily to blame for this condition, but the superintendents of school systems. Supervision, originally intended to be an aid to teachers, has become an intolerable incubus. Teachers are supervised to desperation. The unobtrusive way in which the supervision is sometimes administered does not lessen its tyranny. Teachers are well aware that the suggestion of a method implies the expectation that it will be used. So strong is this feeling that, even in the instances where no compulsion is intended, teachers nevertheless regard the suggestion as mandatory. And this weakens the feeling of responsibility. "We cannot help ourselves; we must do things in this way," is a common remark of teachers. Modern business has developed a wholly different method. Managers are put in charge of departments, and the entire control is given into their hands. They know what results are expected, and that they are the ones who will be held responsible. If they do not succeed they are replaced by others; but the owners seldom give them a plan of detailed instructions. The result of this method has been the evolution of a body of splendid managers who, in many instances, understand the business better than the owners. It is the *clerks* who work from detailed plans, and all that is wanted here is accuracy in following orders. Originality in them is not desired, and if by chance some happen to have any at the beginning, it is soon smoothed down to common mediocrity.

Now this is practically the condition of teachers. The superintendents are the managers, and the teachers are the clerks.

This condition has had the effect that routine work always has, and so school teaching has become mechanized. In city schools it is the organization that is praised. Plans of brilliant intricacy are worked out, and the chief work of the principals is to see that there is no jolt in the running of the machinery. The result is that a city may have a splendid *system* of schools, with any number of poor schools within the system. Those that do not deteriorate maintain their efficiency by resisting the mechanizing process, but such independent principals are eliminated as soon as it can be done without trouble. How to save their pupils from the evils of official formalism, while still conforming sufficiently to escape censure, is becoming more and more of a problem to enlightened teachers. The necessity of such evasion is pathetic. Superintendents are insisting that school boards shall not interfere in the selection of teachers, nor in matters that pertain to instruction, and in this they are unquestionably right; but the principle deserves more general application. Not only should superintendents be unhampered in their work, but the same freedom should be extended by them to their subordinates. The argument with which one is always confronted when insisting upon this is that teachers are incompetent. Several things may be said in reply; first, all teachers are not incompetent, and, second, this method of procedure produces and preserves incompetents. Those with the best minds either refuse to go into the work, or, if they do, finding themselves held under a deadening restraint, they withdraw as soon as

they can find something else to do. Able young men are continually leaving teaching for work where their ability may find some range for action. Adaptation to environment is one of the fundamental laws of nature. The conditions to which the adaptation must be made are the selecting force, and determine who are the fit.

In the instance under discussion the conditions that must be met select for survival the least original, those least qualified to act wisely through their own initiative. Men and women of independence and power will not continue in a position in which individuality must be submerged in obedience. Blind obedience is the principle of military operations where the purpose is the creation of a set of artificial and temporary conditions that shall overwhelm the enemy. Education, on the other hand, is concerned with growth and development, the conditions of which are given in the mental and physical organization of those to be educated. Education, above all else, must be flexible. Human nature is too variable to be adequately treated by mimeographed prescriptions. It is because of this that the organized machinery of systems of schools is so disastrous. It does not lend itself to differing needs. Man is afflicted with a curious mental scotoma. He inclines to think himself free from the biological laws to which he readily believes the lower animals subject. Yet adaptation is no less forceful in human than in animal society. When this is clearly understood and acted upon, there will be less waste of social and educational energy.

We hear much about the necessity of waiting until people are educated up to opportunities before granting them, but no amount of preliminary education will ever bring the desired result so long as the opportunities

themselves are withheld. Indeed, so potent is adaptation that the very training itself, though intended to fit for new responsibilities gradually succumbs to the subtle influences of prevailing conditions and drops to a lower level. That this has been the case with teaching casual observation will show. Teachers' institutes and other meetings, intended primarily to be educative, are frequently so stale that the more intelligent among the teachers openly say that they get little from them. Teachers have been forced to become official demonstrators. They are not supposed to have ideas, at least not about teaching; that is a privilege permitted solely to the managers. Only the pedagogy that bears the official stamp is allowed in their system. The function of the teacher is to tie up the pedagogy in packages suitable for each applicant for knowledge, but even here little freedom is allowed, since the instructor is given a definite amount of information, all carefully weighed out in the official scales, and is expected to dispose of it by the end of the term. The result is that some children receive more than they can carry away, while others would like more; but to yield to such little matters as individual differences is usually contrary to official pedagogy.

The efficiency of the teaching force is seriously affected by the salaries that are paid. This subject has recently been investigated by a committee of the National Educational Association, and the report[1] was made to the Association at the July meeting, 1905.

In 463 cities and towns of 8,000 population or over,

[1] *Report of the Committee on Salaries, Tenure, and Pensions of Public School Teachers in the United States.* Submitted to the Council of the National Educational Association, March 7, 1905, and published July, 1905.

New York, Chicago, Philadelphia, and Boston being excluded, the average salary for elementary teachers is $556 for women, and $653 for men. But even these low figures show only a part of the truth. In 14 of these cities the average salary of women teachers in elementary schools was less than $350; "in 64 cities it was $350 or over, but less than $450; in 125 cities, or 26.4 per cent., it was $450 or over, but less than $500; in 61 cities it was $500 or over, but less than $600; in 19 cities it was $600 or over, but less than $650; and in only 42 cities, or 8.9 per cent., was the average salary as much as $650."

Taking up the minimum salaries paid to women teachers in elementary schools, the committee found that "in 64 cities some of the teachers received less than $300 a year; in 116 cities $300 or over, but less than $350; in 125 cities $350 or over, but less than $400; in 89 cities $400 or over, but less than $450; in 38 cities $450 or over, but less than $500; in 26 cities $500 or over, but less than $600; and in 18 cities $600 or over. . . . In 62.1 per cent. of the cities the minimum salary paid was less than $400, and in only 12.1 per cent. was it as high as $500." But the very low salaries were not characteristic of the smaller towns and cities only. "On the contrary, of the 39 cities with a population of 100,000 or over, 21 cities reported teachers in elementary schools in receipt of yearly salaries of $400 or less."

"The workman at common labor who has steady employment earns more in a year than many of the teachers in elementary schools. Thus a comparison of the weekly wages of municipal laborers on street and sewer work and the minimum yearly salaries of teachers

in elementary schools, in 47 cities, shows that, except in 4 cities, the laborer who has work for 50 weeks, say, earns more than the teacher. In many cases the laborer's pay under such conditions is greatly in excess of that of the teacher." The absurdity of the situation becomes more apparent when we remember, as the report shows, that this comparison is with the commonest unskilled labor for which absolutely no preparation is required, "while in scarcely any city of importance can a man or woman obtain a position as teacher at even the minimum salary without some previous experience at a lower salary, or some special preparation." The committee might have added that, in some cities, and the number is increasing, both special preparation and some previous experience are required. "In a majority of cities," the report continues, "the minimum salary—that for regular teachers in their first year—is far below a fair living standard, and therefore too low to attract to the profession the best material—the prime essential for a strong teaching force." [1]

This puts a very serious question squarely before the American people. With such salaries the wonder is that the quality of teaching is as good as it is. Housemaids receive more than $200 a year in addition to room and board, and the union rate of wages for hod-carriers in New York State is $3 a day, or $900 for the year.[2] It is edifying to talk of the pleasure derived from helping children to develop, but teachers, like other people, must live, and the joys of altruism do not buy clothes, food, or summer recreation to re-

[1] Since the publication of the report, salaries have been increased in a few cities, but the advance has been so slight that even in those cities the situation has not been essentially improved.

[2] *Collier's*, January 12, 1907.

build energy. One of the conditions of good teaching is opportunity for the teacher's continued mental growth, and this involves the expense of books, and lectures, and leisure for rest and travel.

School boards should be educated to feel the necessity to their teachers of a periodical year of freedom for travel and study, which colleges are coming to recognize as essential for persistent efficiency. The assumption that elementary and secondary school subjects are so simple as to require no relaxation and little, if any, preparation is a relic of early days when people thought of school teaching as lesson hearing. The larger interpretation of education, slowly winning its way, requires an enormous expenditure of energy, and conscientious teachers soon wear out under the strain. Nervous teachers produce irritable children. The sabbatical year on half-pay would give opportunity for intellectual refreshment, and the school would be continually rejuvenated by the infusion of new knowledge and enthusiasm. The inclination of a few teachers to spend the year in other remunerative work, which has sometimes cropped out where the plan has been tried, could be checked by making the half-pay conditional on the use of the time for intellectual and physical development.

With salaries commensurate to the broad needs of teachers, with periodical off-years for physical preservation and mental growth, and freedom of initiative for intellectual expansion, good results may be demanded, and the incompetent would gradually be eliminated. By encouraging the imitatively and clerically inclined, the present system favors the incompetents and gives them an advantage in the struggle for continuance in the work. So long as we are satisfied with mediocrity,

that is what we shall get. As a matter of fact, public school teachers, as a class, are exceedingly conscientious, and anxious to do their work in the best way. Their economic dependence, however, forces them to acquiesce in the methods approved by those on whom their position depends. Consequently, they are feeble in initiative, looking to their superiors for guidance. Now, as we have said, those in high places discourage departure from established practices. They feel that they have vested rights in the prevailing ideas. The same opposition to the new has delayed the progress of every science. In each instance there has been the same investigation by individuals, and the same resistance on the part of those in positions of influence to views in conflict with ideas to which habit has given the semblance of revealed truth. The story of reforms suppressed and discoveries strangled at their birth is a long and sad chapter in the growth of human intelligence. The spontaneous generationists laughed at Pasteur and derided him while he was quietly working at the experiments which in the end were to put them to confusion. "I am afraid," wrote one scientist, "that the experiments you quote, M. Pasteur, will turn against you. . . . The world into which you wish to take us is really too fantastic." [1] This is not unlike the charge made to-day against educational fads. Even after Pasteur had shown "that there is nothing in the air that is conditional to life, except the germs that it carries," a noted scientist advised the inquiring "to accept the doctrine of spontaneous generation adopted by so many men of genius." [2]

[1] Renl Vallery-Radot's *Life of Pasteur*, Vol. I, p. 129.
[2] *Ibid.*, p. 122–123.

Robert Livingston, former Minister to France and a friend of Robert Fulton, induced the New York Legislature to introduce a bill encouraging the invention of a steamboat that could run at least four miles an hour. A member of the New York Senate at that time has given a picture of the Senate's attitude toward such an innovation. Throughout the session it was the standing subject of ridicule, "and whenever there was a disposition in any of the younger members to indulge in a little levity they would call up the steamboat bill, that they might divert themselves at the expense of the project and its advocates." [1]

Benjamin Franklin's paper on the "Sameness of Lightning with Electricity" was greeted with the same merriment when read before the Royal Society, the members roaring with laughter at so absurd an idea.[2]

That opposition to progress in scientific subjects is less noticeable than formerly is due to the astonishing rapidity with which discoveries have followed one another in recent years. This has wrought a profound change in the mental attitude of people toward physical phenomena. The very profusion of discoveries has forced us to a realization of a new fact in nature—that remarkable new interpretations are to be expected, that they are in the nature of things. But, curiously, this new fact has been essentially, though unconsciously, limited to physical phenomena.

Educational reforms are not so demonstrable as the "Sameness of Lightning with Electricity," and it is chiefly for this reason that "experience" continues to impress us with the sacredness of its mysteries. The

[1] *The Life of Robert Fulton*, by Cadwallader D. Colden, 1817, p. 56.
[2] Franklin's *Autobiography* (the Century Co. edition), pp. 269, 270.

educational situation, however, has undoubtedly undergone a change in this respect. Robert Southey would not be expelled from school to-day for writing an article against flogging, nor would he, because of such expulsion, be refused admission to college, and it may be doubted whether the mistake of the Boston schoolmasters in issuing their famous "Remarks" concerning the Seventh Annual Report of Horace Mann could be repeated. Still, there is a contentment with present conditions that is most unfavorable to educational progress. Education is still in the emotional stage from which the natural sciences have just emerged. Teachers feel that their method is a part of themselves, and they resent any criticism as a personal matter.

The transitional stage through which education is now passing has left great uncertainty regarding the treatment of children, and an anonymous "old German American" [1] holds that the chief cause of our trouble is the opposition of children in a democracy to authority. We concede that many school problems are greatly simplified in countries where unquestioning submission to authority is the first virtue. Under the conviction that the finest types of men and women are not reared under conditions of submission, control through mere external authority is passing from our schools because it does not harmonize with the American character. The German mental attitude has its origin in the belief that authority is divinely given. Even if the strict acceptance of this idea has been abandoned, German life and character are still greatly subject to it. Americans, on the other hand, realize

[1] "Warum kann die amerikanische Volksschule nicht leisten was die deutsche leistet?"

that law and authority are their creation. They made them, and they can break or change them. The belief that governments are instituted among men to secure life, liberty, and the pursuit of happiness introduced a new racial element that has deeply shaped the evolution of American character, and it would be an exception to the effect of environment so curious as to well nigh constitute a monstrosity, if boys could grow up amid criticism of law and order and public officials so common as to attract attention only by its absence, without applying it to those immediately over them; and if at times they tend to emphasize liberty and the pursuit of happiness to a disproportionate extent, they but emulate many adults who cannot reasonably offer the excuse of lack of restraining social and other altruistic impulses, which are not expected to exert a controlling influence on immature minds. It is a mistake, however, to lament this independence in thought and action of American boys. It is fundamental to American character, and the success of democratic institutions depends upon its growth. Men who are courageous and aggressive toward civic and national corruption and usurpation cannot be made out of timid, servile boys. For a democracy to look continually to monarchical countries for educational principles is quite as shortsighted as to turn to them for principles of national executive policy. The American boy is rebellious against authority when it does not appeal to his sense of justice, but that he can accomplish wonders when he finds himself in harmony with it, self-government among boys has demonstrated.

Perhaps the most important contribution of race-psychology to education is the fact that educational

problems grow out of the evolution and environment of a people. Each race, in following its own evolutional line of development, feels certain educational needs that arise out of its own peculiar conditions. This is forgotten by those who are continually looking to Germany for educational enlightenment. To the German boy, crude authority is perfectly natural. It awakens in him no resentment because it is drunk in at his mother's breast. For this reason he works easily and effectively under constraint, while the American child does his best work in the consciousness of freedom. It is a race difference. In American schools, therefore, the efficiency of teachers rests largely upon personal influence. Since they can no longer force their pupils to study by the weight of authority exemplified in the rod, their success depends upon ability to arouse in the children a desire to study. Hence conditions affecting the pupils' health or emotions, directly or indirectly, are of special significance to American teachers. The boy who does not "feel right," be the cause physical or mental, will not do his best work.

After all, the assumption that authority is of one kind is a fundamental error. It is customary to look upon external constraint that commands instant obedience to its behests as the only real authority. But this method of control is the crude, primitive sort, and originated in the fascination of display of power. As man evolves, he learns to depend less upon implied force and exacted fear, and more upon personality that wins acquiescence because of the confidence it inspires, as well as from the reasonableness of its demands. This is a higher kind of power.

Education, we have insisted, means a great deal more

than proficiency in a set of studies. Stated in its lowest terms, it implies the ability to interpret situations, to see things in their right proportion, and it is just here that the excessively tutelary method which grew out of a misunderstanding of youth breaks down. Children possess a native feeling of responsibility that may be depended upon if its presence is seriously assumed. The tendency of modern life has been to prolong the period of helplessness. Primitive children develop much more quickly than civilized boys and girls, and while there are doubtless good phylogenetic reasons for this difference, it is nevertheless an open question whether modern town and city life does not unnecessarily prolong irresponsibility. Much has been said lately about short cuts in development, but the changes usually proposed have been severely artificial, determined wholly by conditions external to the child. Investigations in the mutations of animals and plants have clearly proven that they are capable of much more rapid change than was formerly thought possible, but it should be remembered that in this experimental work these changes are always directed toward a specific end. Burbank sets himself to bring about certain definite results, and all forms that do not subserve these ends are destroyed. This marks a distinct difference between education and forced biological mutation. The educator cannot destroy children who do not exhibit the qualities he seeks. If it were his function to predetermine ends, and then to create new mutations leading toward them, he could not construct his type by effacing the discordant individuals. But the educator is limited, in the ends that he may pre-elect, by the complexity of human life. The very child whose

qualities he disapproves of may be the germ of a man much beyond his mental reach. The teacher must be very guarded in dictating to nature. Even if the forces of crossing and selection at the disposal of the botanist could be controlled in the case of man, some of the best products of nature might be weeded out by such intervention. In a region so subtle there is difficulty in determining the particular variation best adapted to the broadest conditions of human progress. To fit solely for the immediate present, for example, would evidently be unwise as leaving out of account change of environment. It does not look to the future.

It is just in the uncertainty of short cuts of this kind, however, that the educational method for shortening the process of human development emerges. Children should be surrounded with conditions that are favorable to the fullest individualization, which is bringing to fulfilment all the natural variations with which we are born. But in this process the sort of selection made, as well as the time of utilization of the environmental material must be largely left to them. In other words, great possible mutations are latent in children, but are suppressed by an education that keeps them tied to a stake rope. Such a range is too restricted to allow great diversity. It is by the possibility of free individualization that deferred instincts in the lower animals are converted into real forces in their development, and man should not utilize less what nature gives him.

The influence of suggestion through environment has never received its proper recognition in education. Teachers want to play a more conspicuous part in the mentation of their pupils. In the early history of our country, education was little developed, and this forced

the let-alone, suggestive method upon our fathers. Their compulsory and, in the nature of the case, unconscious acquiescence in it is the explanation of the fact that so much was accomplished with so little "schooling." To-day boys and girls of the well-to-do classes are largely shielded from the necessity of thinking and acting, and this protection tends to prolong artificially the period of helplessness. Changed conditions have caused this, and in so doing have put a new problem upon the schools. The contention that the duty of the public schools ends with giving good instruction in the studies of the course is an error, because these studies touch life at comparatively few points, and besides, much of this information is forgotten. Information, in itself of little effective value, is only a means for attaining the larger educational end—the power adequately to interpret ideas and situations, and the development of will to act on these interpretations.

But as yet the schools are preëminently adapted by their organization to acquisition, and are very imperfectly fitted for the cultivation of growth in conscious control. We inherit our school-room methods from a period when information was the chief need, or, at any rate, was so regarded. A very general phenomenon in organisms is the persistence of structures adapted to a previous condition which no longer exists. In human society these survivals are seen in many social forms whose antiquity wins unmerited reverence. Teaching is no exception to this law. So we continue under much the same theory of school-room organization, fancying great progress when a few new devices are invented, or we have altered the wording of the formulas. Yet the boy enters a very different sort of life

when he leaves school to-day from that of even fifty years ago, and recent investigations have greatly changed and enlarged the earlier views of mental growth. But these facts have not correspondingly changed the method of the school-room. Every one admits, theoretically, that children learn by doing, but their activity is still mainly limited to certain subjects that are attached like an appendix to the educational alimentary canal. It is the antique way to sit in front of a class and ask questions, and it is pretty apt to make helpless parrots of the pupils.

The rational method is to work with the students, inspiring them with longing to delve into things for themselves and make their contribution to the common fund of knowledge to be discussed and clarified in the recitation. The didactic method belongs to the Middle Ages. It still dominates our schools, though the conditions that made it serviceable have long since passed. Mental expansion of the teachers themselves is the first step toward removing the mediæval *débris*. They will then investigate with their pupils, the school-room will become an educational laboratory, and activity will not be limited to the manual-training department. But this new fertility of teachers postulates lifting teaching to a higher plane by doubling the teaching force of the nation, insisting rigorously that all teachers shall be persons of advanced development, equal to these high demands, and, as before stated, by remunerating on a scale that will win such persons and induce brains of the first rank of ability to elect and prepare for the work. Teaching will then cease to be looked upon as the most available point of outlook for finding life's vocation in some other field.

Science laboratories, whose attachment to high schools added a new organ for mental nutrition, have never passed, in many schools, beyond the rudimentary stage. Directions for work, so minute as to remove all need for individual initiative, are given, and the chief thing required of the pupils is to do what they are told to do, and to see what they are told to see. So conveniently, many times, are these directions prepared, that pupils may work them backward, and so secure much greater accuracy in the results, and with less expenditure of time.

Lovejoy,[1] in a series of questions submitted to the entering freshman class in one of the leading colleges of the Middle West, found astonishing ignorance concerning some commonplaces of knowledge. In an English class of twenty-eight, fifteen were unable to name six living writers of English, and the list of "the most interesting and valuable" books which they had read included only four which were not fiction, while of the twenty novels mentioned only eight or nine were of literary importance. Equally surprising were the answers of thirty-eight to questions in American history. Four were unable to name any general upon either side in the Civil War, while many of those who made the attempt were curiously confused, some naming Lincoln and Jackson as Northern generals. Less than half the class were able to give even approximately the cause of the recent Russo-Japanese War. Altogether, the answers showed very limited interests, and indicated that the high-school soil is too barren for a vigorous growth of enthusiasms.

[1] *The Bulletin of the Washington University Association*, Vol. V, 1907, p. 105.

Closely connected with this is the helplessness in college of high-school graduates when left to their own resources. As a rule, they are unable to work out any problem by themselves. They do not even know how to get the information needed for its solution. This same helplessness is the basis of the complaint of business men who take them into their employ. Their school life has been characterized by complaisant conformity to directions, learning, so far as required, what was put before them, but uninspired to wander from the beaten track and bring some contribution of their own. It is simpler to follow, especially when it leads to good examination marks, and pupils rarely reach out farther in their work than is required by the standard of their tests. But the college is little better. Here, also, is enthusiasm chilled by the same schoolish ideals, and study rarely rises above successful imitation. Information is prescribed in set doses, and the standing of the students depends upon the methodical regularity with which they take their medicine. Some have adopted a saner plan, but it is still decidedly true that a very small fraction of college graduates are sent out fitted for action in the world. They have to learn all that at great cost afterward. The college, as well as the public school, misconceives its task.

A factor in perpetuating these conditions is the idolatry of examinations and percentages, to which we have already referred. The fundamental error under which schools are working to-day, is the feeling that they must have something which can be displayed as evidence of progress. The author's studies in the learning process demonstrate that learners are not always ready to express what they have acquired. There are

stages in the growth of learning when their knowledge refuses to reveal itself for show, and this may be a reason why so many boys of future eminence have been dullards at school. Their greater natures, besides rebelling against the innutritious pabulum offered, did not grow in the examinable way. Perhaps, also, this is why those who enter college with conditions stand at least an equal chance of ranking high as compared with the seemingly brighter, unconditioned students, as Thorndike [1] found in Columbia University.

The boy at all stages is estimated from some point of view which adults think of vital importance, and this is fatal. With teachers the favorite unit of value is ability to acquire certain species of knowledge in a certain definite way. This standardizing of mentality leads to mutilation of boy nature, and he carries the wounds through life. Boys are decidedly individualistic. They all have points of approach easy of access if the right path is taken, but they may be unassailable from other sides. But these points of access are not the same in different individuals, and failure to recognize this wastes perhaps half of the energy applied by society to education. The grown man forgets the steps by which he has progressed. He reads back into his childhood the motives of present, mature years. Childhood's ideas, therefore, seem trivial to him; and yet to expect adult motives to appeal to children is unreasonable, because the events needed to give them validity have not been experienced. One of the highest problems of education is to furnish these experiences

[1] J. McKeen Cattell: "Examinations, Grades and Credits," *Popular Science Monthly*, Vol. LXVI, 1905, p. 369.

without the losses that their later acquisition in the outside world would bring.

The teacher's work then is highly constructive. No longer the austere ogre that excoriates the evil spirits of the race inherited in children, he fraternizes with these "evil" tendencies and makes them his allies in promoting growth from evolutional primitiveness. In this way he wins his pupils to their studies through native interests, watches each new nascent impulse to take it at its flood, and so makes the school life one of coöperative activity, in which each pupil plays his part with zest because his individual abilities and impulses are the point from which he starts. His enthusiasm continues keen because he does what his ability permits. Instead of marking time till others may catch up, or hurrying forward beyond his strength, he works naturally to his limit, conscious always of his contribution to the production of the whole. And this, too, would bridge the chasm between school and the world outside, by removing it. Children would be put more upon their own responsibility, seeking and obtaining help when it is needed—the time when it is most effective for development. The acquisition of facts whose significance the children do not see, and many of which have little, would then cease to characterize education. What is learned would be used in what is done, and what is done determined by the stage each has attained in his development, with thought both to his larger racial life and future modern needs. When education is thus rationalized, the personality of children will not be smoothed down to common and uninteresting homogeneity, as the present system of mass education with its mistaken idea of educational economy seems to

require. Friction-energy—energy misused, and therefore creating the demand for discipline—will then be taken up and largely disappear in the self-control that experiments have shown springs spontaneously from the growing feeling of individual responsibility. And this feeling of responsibility will come from educators laying aside the lofty pedagogical attitude and substituting that of mutual help, confidence, and fellowship with the student, in place of mastership.

But after education has been perfected as much as possible, we have still before us the undermining fact that a great host of the children of the nation can only slightly profit by it, because they are too poor in a land superabundantly rich. There is, as we pointed out, besides the children who now abandon the school because under present methods the schools repel them, another wide class, the children of the not-well-off, who must go to work. And we said that, no matter how much education is improved, it will not reach the majority of this great class. What about them, and what about the chances of free democratic institutions while such conditions exist?

We need only survey the factories and the homes of the working class to see the inherent antagonism of our industrial system to education. The legitimate things of life are not obtained even when all the children in a family work, and education has to be sacrificed. This is so, as well, of many who would be ranked in the middle social class. How, then, is education to do its work of preserving democracy? It is a task too large. And in this stress it demands an industrial system in which *all* can be *well* educated. It cannot accept anything less and do the work required of it—

preserve free institutions. Yet to-day great numbers can hardly be educated at all because of the necessity of earning a living. And this sinister necessity is due to the industrial system, for there is an immense plethora of wealth, enough to educate all amply and highly, and to provide for all other legitimate needs besides. .

What is education to do? It is required by society to preserve democracy, and the economical order that has grown up forbids it to do so. Plainly, its duty is to correct the economic order until education has its rights and can do its work; until education can reach *all* in full measure; until it can preserve the foundations of popular government.

Does this require every educator to be a specialist in social problems? It does to the extent of knowing how the distribution of wealth and income of society can be rearranged so as to permit all children and youths to receive a full education. This much is a *sine qua non* of the educational understanding. And it may also be added from the deeper philosophical view-point, that, since the purpose of education is to prepare the young to live in society, since this is why we educate, it is curious to suppose that an educator can do this who does not comprehend society and its problems.

The outlook of education here traced is somewhat commensurate with its true nature. Education is not mere schoolmastering. Schoolmastering is one function—perhaps a very small one. There is evidently a larger conception of education to be developed. Let us now consider it.

CHAPTER X

MAN'S EDUCATIONAL RECONSTRUCTION OF NATURE

The purpose of education among those animals that train their young is adaptation to environment. Man's endeavor is the same, but with the growth of human society and of knowledge his environment has profoundly altered, a fact that education has only partially recognized, and this alteration has made it necessary to reinterpret adaptation. Among the lower animals, nature secures the necessary results mainly through instinct.

Jennings found[1] that paramecia collect around a mass of bacteria, pushing and crowding one another in apparent effort to reach the food; and Binet,[2] in one of those delightful, imaginative flights in which even the scientific mind at times is wont to recreate, would have us believe that most, if not all, of the higher intellectual processes, including choice and volition, form part of the mental life of micro-organisms. But we are clearly drawing inferences beyond our right, if we assume that action here has any other cause than the necessity which selection has made the conditions of survival. These organisms must do certain things and do them

[1] "Psychology of a Protozoan," *American Journal of Psychology*, Vol. X, 1899, p. 503.

[2] Binet: *The Psychic Life of Micro-Organisms*, 1899, p. 61.

always, under penalty of extinction, and perhaps this is the reason why these same paramecia begin to gather around innutritious substances quite as surely as around nutritious. The attraction which a dilute solution of carbon dioxide has for them would then, as Jennings has suggested, be due to the fact that this product of organic waste is found wherever paramecia assemble; therefore, as they gather more often than otherwise around food, and natural selection demands that they lose no chance of finding nutriment, carbon dioxide becomes a blind call to food. Instinct is thus organic behavior originating in the necessity of adaptation and directed in its course through the exigencies of the environment by natural selection. Whitman[1] has observed that our fresh-water salamander, *Necturus*, reacts to any object quietly introduced into the water, as though it were food. If so small an object as a needle, he says, be brought into contact with the surface of the water, *Necturus* instantly turns toward it. The reason is that the animal receives exactly the same stimulus from a foreign object that touches or passes through the water as it does from that which serves as food. In other words, the animal responds primarily to water undulations, regardless of their cause, because it is through such undulations that it receives notice of the presence of food. In its most typical form instinct is thus seen to be chiefly a matter of animal organization, and the response to stimuli to be largely mechanical. This makes stable conditions necessary if it is to meet educational needs. But even here there is a little variation in the manner of reaction. *Necturus* has learned

[1] *Biological Lectures from the Marine Laboratory at Wood's Holl, Massachusetts*, 1898, p. 303.

to discriminate somewhat between experiences, for, according to Whitman, "there is unmistakably a power of inhibition strong enough to counteract the strongest motive to act—the hunger of a starving animal in the presence of food."[1] But such limited power of reaction does not go far, and it will meet the needs of animals only so long as their life is of the simplest sort. They are probably capable of few adaptations, and these must be made at an enormous cost of time and life. But as life becomes more complex and less regular these instinctive responses do not answer. Animals must now learn to remember, and their actions must be guided by past experiences of threatening disaster, else they cannot survive in the struggle.

Not many experiments have been made on the educability of animals low in the scale, but fishes have been taught to refrain from attacking minnows that are their usual food, by separating them with a glass partition extending across the aquarium until the larger fishes learn by repeated bumps on the nose that the little ones are not to be eaten.[2] Thorndike[3] has shown also that the minnow, *Fundulus*, can learn to find its way through a series of three partitions, each with an opening so located as to make the journey circuitous, and that it gradually improves on its previous record by eliminating blunders until finally it learns to go directly to each opening. While we do not know much about the mental processes here, it grows increasingly harder to explain action solely by the neural mechanism. Ex-

[1] *Loc. cit.*, p. 305.
[2] See statement of Moebius's experiment in Darwin's *Descent of Man*, 2d ed., p. 76, and Triplett's "The Educability of the Perch," *American Journal of Psychology*, Vol. XII, p. 354.
[3] *American Naturalist*, Vol. XXXIII, p. 923.

perience is evidently taking a more active part in the animal's life. The nervous system is becoming more flexible, more adaptable.

Recent observation has somewhat modified our views regarding action among lower animals. Jennings' studies[1] indicate that the method of trial and error is common even in one-celled organisms. This method, wherever found, unquestionably involves in some degree the utilization of experience. Such creatures can no longer be considered as merely reflex organisms in the presence of new needs and difficulties, or, if we still designate their action in this way, the interpretation of "reflex" must be profoundly altered. Throughout the animal series improvement in the reaction to environment seems to signify greater nervous flexibility in dealing with experience rather than a complete change of method. In their fascinating paper[2] on the habits of solitary wasps, the Peckhams tell of one who in filling up her nest "put her head down into it and bit away the loose earth from the sides, letting it fall to the bottom of the burrow, and then, after a quantity had accumulated, jammed it down with her head. She then brought earth from the outside and passed it in, afterwards biting more from the sides. When, at last, the filling was level with the ground, she brought a quantity of fine grains of dirt to the spot, and picking up a small pebble in her mandibles, used it as a hammer, pounding them down with rapid strokes, thus making this spot as hard and firm as the surrounding surface."

[1] *Contributions to the Study of the Behavior of Lower Organisms*, p. 237; Carnegie Institution, Washington, 1904. *Behavior of Lower Organisms*, 1906.

[2] "On the Instincts and Habits of the Solitary Wasps," by Geo. W. and Elizabeth G. Peckham, *Wisconsin Geological and Natural History Survey*, Bulletin No. 2, Scientific Series No. 1, Madison, Wis., 1898.

Soon "she had dropped her stone and was bringing more earth,"[1] when she again picked up the pebble and pounded that which was brought until all was hard.

The power to inhibit, so that the same action does not always follow the same stimulus under the same circumstances, which was observed in *Necturus*, indicates, perhaps, the first break in the mechanism of primitive instincts. The part that experience plays in the animal's life is becoming more immediate and direct. Just how much consciousness is involved in this, or, indeed, whether there is any, we do not know. Investigation has shown[2] that in man consciousness of means is not essential to the utilization of experience, and there is certainly no reason for thinking it more necessary to the lower animals.

In the variability of instinct, also, we find mechanical organization less domineering, and in the study of wasps, to which we have just referred, the one pre-eminent, unmistakable, and ever-present fact is variability. "Variability in every particular—in the shape of the nest and the manner of digging it, in the condition of the nest (whether closed or open) when left temporarily, in the method of stinging their prey, in the degree of malaxation, in the manner of carrying the victim, in the way of closing the nest, and last, and most important of all, in the condition produced in the victims of the stinging," some of them dying "long before the larva is ready to begin on them, while others live long past the time at which they would have been at-

[1] *Loc. cit.*, pp. 22, 23.
[2] Swift: "The Psychology of Learning," *American Journal of Psychology*, Vol. XIV, p. 217.

tacked and destroyed" had not the investigation "interfered with the natural course of events."[1] In this breaking away from the inherited way of doing things we seem to have a sort of organic initiative which, if we may not call it intelligence, must, after all, develop into it.

Observations on higher animals have been numerous, and Darwin quotes with approval a statement of Rengger that when he first gave eggs to his monkeys in Paraguay, "they smashed them, and thus lost much of their contents; afterward they gently hit one end against some hard body, and picked off the bits of shell with their fingers."[2] Kinnaman,[3] in an extended study of the intelligence of two monkeys, found that they could learn to manipulate a complex series of locks and latches on a box, and that they made some progress in choosing better methods by eliminating useless acts and in making short cuts. He also tested men with the same apparatus, and found that some were slower than the monkeys in finding how to open the box. While there was no evidence of ability to count, one of the monkeys could recognize position as far as three and the other as far as six.

All this is a clear advance on the mental processes of lower animals, which cannot be explained solely by the mechanical response of a better organized nervous system. The change from the animal's customary behavior is too great and the variations too sudden for mechanical organization to account for them. And yet Kinnaman's report shows little method in it all. The

[1] *Loc. cit.*, p. 30.
[2] *Descent of Man*, 2d ed., p. 78.
[3] *American Journal of Psychology*, Vol. XIII, pp. 98 and 173.

monkeys knew enough to know when they had failed, which is more than can be said of the fishes until it had been battered into their nervous system through repeated blows on their heads, and they gradually improved on their method by making short cuts. But Thorndike's fishes also showed this improvement, though much more slowly. And this seems to mark an important difference in mental life. Monkeys do not need to wait until a certain mode of behavior has been worked into the mechanism of their organism by the operation of natural selection as do paramecia, nor is it necessary that the external constraint, which encourages inhibition, be continued for so long a time as in the case of fishes. But, after all, the reasoning of monkeys seems to be of the same associative sort as that of fishes, and there is certainly no convincing evidence that they are able to get beyond this. Kinnaman thought that their action indicated generic images which enabled them to carry over something from a previous experience to a new situation, but we have already seen that even in man consciousness of the process is not necessary to the utilization of experience, and it is difficult to see what a generic image of which we are unconscious could be. Indeed, on the theory of evolution, consciousness as an originating force in the learning process would seem to be much less necessary to the lower animals than to man, and the farther down the series we go the less important would it become, until, among micro-organisms, we cannot speak of conscious adaptation without greatly overstepping the bounds of scientific accuracy. So far as the evidence goes, learning among the lower animals is strictly a matter of association. The more intelligent of them

appreciate the failure of a method more quickly than the others, and the discomfort resulting from it exerts a depressant effect upon the whole neuro-muscular system which, as we have seen, tends to break up the incipient coördinations involved in the original action, and even to obliterate their neural effects. All this, of course, reacts against repetition. Success, on the other hand, is attended by a pleasurable feeling, and every one has observed the joyous look of animals capable of expressing their emotions, when they have accomplished what they have been trying to do. These pleasurable feelings, in turn, increase the muscular tonicity which always tends to motor discharge, and this results in a partial reinervation of the coördinated group of muscles that were involved in the original movement. This naturally deepens the existing neural effect and promotes the repetition of the movement that occasioned it.

So far as our present state of knowledge permits us to draw conclusions, the intellectual difference between man and the lower animals consists primarily in just this difference between associative reasoning on the one hand, and, on the other, inference in which the connection is obscured, by time or space, or by the complexity of the elements involved. And here, as before, the part that experience plays in determining action is the measure of intellect, only now its influence has been enormously multiplied. Articulate speech has enabled man to organize his experiences and transmit what he has learned, and it is not improbable that the higher psychical processes involved in reasoning owe to this human acquisition their development, if not their origin. Speech has greatly accelerated adaptation—by

no means an unimportant factor in the rapid changes of man's experience, since through it we learn from others that which may benefit or injure, and so avoid what might mean destruction of the species. And then, too, by enlarging the sum of experiences, it has greatly increased the facility in acquisition and assimilation which play so important a rôle in human progress.

Learning in man, whether it be a new adaptation to a changed situation or the acceptance of an intellectual truth or moral principle, depends much upon the content of the individual mind, and this assumes infinitely greater importance in man than in the lower animals because of the immense complications of his environment. With animals this content embraces, at most, relation to the physical world and to other animals, but with man the physical world means and includes much more. It grows until it embraces the universe, and the relation to others widens till, from a simple physical relation, it involves the action of men on the highest plane of consciousness. Education in man is to fit his offspring for all this—for the most perfect attainable life in this complicated and ever-growing physical and psychical environment. We have to educate for an essentially new universe, and the demand for studies that will be directly useful in life, now becoming so energetic, while one strong expression of the growing consciousness of this need, is yet an utterly inadequate expression of it.

Clearly, education through instinct, nature's way, becomes then wholly insufficient for man. Its method of adaptation is too slow, when physical and psychical conditions change so rapidly. Besides, it costs enor-

mously. The herring lays twenty thousand eggs, the oyster upward of sixteen million, while the conger-eel requires the enormous number of fifteen million annually to save itself from annihilation.[1] Marshall and Brooks estimate that if you start with one oyster producing sixteen million eggs, half of which are females, and let them go on increasing at the same rate for five years there would be oysters enough, if we estimate them as shells, to make a mass more than eight times the size of the earth.[2] As we descend the animal series these facts become still more startling. "Certain bacteria multiply so rapidly that the descendants of a single individual, if allowed to multiply unhindered for three days, would be represented by the figures 47,000,000,000,000."[3]

Among lower animals the individual is of little importance because infinite numbers can be produced, and the cost does not matter much; but in the human world the individual has become of supreme importance. It is costly to vitality to bring even one to maturity, and expensive in every way to train him. Besides, the worth of a human being is recognized as permanent. A fine individual is of the highest value to the whole. The best are pioneers to a higher level. Superior individuals create a good society, and a superior society, in turn, is a prime factor in the production of the best type of individuals.

With the lower animals the purpose is adaptation to environment, a strictly biological end, but the growth of knowledge and culture has introduced a higher element

[1] C. J. Marshall: *Lectures on the Darwinian Theory*, New York, 1900, p. 39.
[2] *Loc. cit.* pp. 39, 40. W. K. Brooks: *The Oyster*, p. 50.
[3] H. W. Conn: *The Method of Evolution*, p. 53.

into human society which adaptation cannot fully satisfy. This is, that man must always improve his environment. Character is not merely a matter of heredity, but of heredity acted upon by environment. We have seen this illustrated on the one side by the Juke family, and on the other by the transformation wrought in boys of criminal parents when placed in good surroundings. Many are convinced that the elimination of those in whom the anti-moral tendencies are strong is essential for moral evolution, and this is certainly nature's method, as she deals summarily with animals whose actions are at variance with the immediate good of the species. But human progress is not so simple, its problems are not so easy of solution. Discrimination is necessary in order to know what are the anti-moral proclivities. Seemingly reversionary tendencies in early life, for example, are not always bad, since many times they are the source of our best social strength and virtues. The so-called criminal instincts of children, as we have shown, are survivals of acts that among primitive races fitted their possessors to survive. Deception, and the strength and willingness to fight well, and to kill, were essential to racial existence, and these were the highest virtues of which primitive man could conceive. To-day these acts are wrong in adults, because they are not only unnecessary, but, in addition, hinder progress. They do not fit man's reconstructed nature. They are anti-social. Yet the elimination of boys with these anti-moral characteristics would be fatal. As already remarked, altruism arose as a kind of enlarged egoism. At first man must have been chiefly, if not wholly, individualistic, but very soon a time came when individual selfishness no longer served its egoistic ends, and self-

preservation required the extension of each self to embrace all members of the tribe. Self-interest thus became absorbed in tribal interest, not at first because of any moral ideas about the rights of others, but solely because in this way each one's self-interests were better served. But these primitive instincts are not without meaning for modern life. The readiness of civilized boys to fight shows an independent, active, aggressive character which, rightly guided, leads to manly courage. The determined opponent of civic corruption, the man whose onslaughts no threats can stay, was a boy who fought for boys' rights. The prevailing social ideas are important in giving these tendencies the direction that makes for progress, and their very persistence and vigor is a necessary element in evolution.

The power of ideas and actions when intelligently applied to conduct has been shown, in a previous chapter, in the complete change of life of the New York City "toughs" who were given the ideals and ambitions of the George Junior Republic. In the slums of the city their racial tendencies followed the drift of excitement and adventure natural to a criminal environment, but with the social suggestions and inspirations of the Republic these instincts found new outlets which led to manhood under civilization, while still satisfying the organic yearnings of the race. The evolutional impulse in all this is an atmosphere of moral thoughts and actions, but we must take care not to confuse mere custom or tradition with morality.

Animals are dependent upon conditions in the selection of which they had no part. Theirs is merely to adapt. Man, on the other hand, may assist in bringing about conditions amid which the next generation will

live. As adaptation is as much a human as an animal characteristic, the importance of the environment becomes evident, especially when we remember that in man, no less than in the lower animals, those qualities that best fit the conditions are selected for survival. Alfred Russell Wallace has given a splendid illustration of this in his *Malay Archipelago*. "There are now," he wrote, "near five hundred people in Dobbo, of various races, all met in this remote corner of the East, as they express it, 'to look for their fortune,' to get money any way they can. They are most of them people who have the very worst reputation for honesty, as well as every other form of morality—Chinese, Bugis, Ceramese, and half-caste Javanese, with a sprinkling of half-wild Papuans from Timor, Babber, and other islands—yet all goes as yet very quietly. This motley, ignorant, blood-thirsty, thievish population live here without the shadow of a government, with no police, no court, and no lawyers; yet they do not cut each other's throats, do not plunder each other day and night, do not fall into the anarchy such a state of things might be supposed to lead to. It is very extraordinary! . . . Trade is the magic that keeps all at peace and unites these discordant elements into a well-behaved community."[1]

The power to modify environment gives man possibilities not possessed by any of the other animals, but it adds vastly to his social responsibility in education. The environment is put upon the lower animals as it were from overhead, and they are left no choice but adaptation or extinction, but man may make his own environment, and in this way break a trail for progress.

[1] *Loc. cit.*, p. 443.

The difficulty in applying the principle of natural selection to education is that we do not intelligently determine who are the fittest. In nature the conditions demanding adaptation are comparatively simple and definite. This is true also of primitive man and, indeed, quite largely of early civilized society. But the enormous enlargement of human interests dims our vision. In one respect the lower animals have the advantage of us in their instinctive educational methods. Their teachers are never troubled by doubts concerning the ability of their pupils. All receive equally careful training for life. They do not prejudice the future of any by an adverse verdict so early in life that the best in them may not yet have appeared. They train all in the best way for success, which in their case means survival, and then leave the final decision to natural selection. The conclusion of one of England's foremost statisticians that the senior wrangler has twenty-five times the innate ability of the lowest on the honor list, because in one year the former obtained 7,500 credits to 300 of the latter, is one of the humorous results of the so-called scientific method of investigation. Against the hallucination of such measurements let us firmly hold to the facts marshalled in previous pages that Darwin's father prognosticated that he would disgrace his family because he cared for nothing but shooting, rat-catching, and dogs, that Harriet Martineau was a dull child, and Seward "too stupid to learn," that Isaac Newton at twelve led his class at the foot, that Samuel Johnson was lazy, Robert Fulton a dullard, Oliver Goldsmith insufferably dull according to his teacher, Byron lowest in his studies, Richard Sheridan insignificant as his teacher saw him, John

Hunter slow and late to learn, Linnæus, in view of his stupidity, recommended by his pedagogue to be a cobbler, and that Dean Swift through "dullness and insufficiency," and Goethe likewise from seeming inability, forfeited their degrees.

It is not to be forgotten that the survival of the fittest is always relative to the conditions demanding adaptation, and, while animals have no preference, man may exercise a choice as to the conditions to which he will adapt himself, and this is broadly the distinctive human quality. The cleverest boys in the slums of New York become the most skilful thieves. In the George Junior Republic, as we have seen, these same boys grow into the best citizens. Here environment is created and chosen by society for the boys; where it appoints them to a slum environment it produces thieves and criminals; where it gives them a rational environment out of the same material it produces first-class types.

Now society may fail to choose for itself the highest goal, which is nothing but failure to select the largest environment to which to adapt itself. It has the choice of various inferior lines of growth. Then "practical" education will aim to fit the individual for most perfect adaptation to the inferior plane chosen. *Man has largely inherited the animal method and only partially adopted the human.* Nature has provided education for animals only in a state of stability. For change, improvement, nature has provided animals with nothing that can be called a method, for the means it uses is destruction—destruction for all who do not conform to the needs of the change, and in working out a new adaptation, the destruction of all who stray extends over an immense period before a new state of stability

is established with a new instinct to conserve it. Now this is an incredibly blundering and costly method where the individual is of any account and where the goal is of value, both of which conditions are true of man. It meets the needs of animals because survival is the only thing aimed at, and the "fittest" are those adapted to the prevailing conditions. The inadequacy of the principle for man and education becomes evident from the fact that the conditions demanding adaptation, if ethically low, will call for and bring out men of an inferior type, and in a society of this kind the few that might seek to make their adaptation to a more universal environment, though they would be the best from the standpoint of civilization and progress, would be suppressed. But the society choosing this principle stagnates and, in the long run, retrogrades. Now the purpose of education should not be merely to fit each generation for adaptation to the grade that society may happen to hold at that time, but to create in men the habit of discriminating and of choosing that which leads to something higher.

The importance of this point of view is not lessened even if it be shown that natural selection is not the only force operative in producing change. New characteristics may appear suddenly, so-called mutations, but their persistence is, after all, dependent upon the environment. True, they may persist without being of immediate advantage, but only when conditions are not too unfavorable. Here, again, it should be the purpose of an intelligently endowed society to make conditions that will preserve incipient and less stable individual variations that have appeared, according to the supposition, through no direct environmental influence,

but which may tend toward a higher social organization. It is not enough that conditions permit the survival of such varieties under difficulties; they should favor their continuance. While some "mutations" may exist under conditions not altogether favorable, others will require social recognition, and society should see to it that the persistence of such sensitive "mutations" is not too hazardous. In this way a tendency to vary, a characteristic which means much for progress, may be fostered. In his work with plants Vilmorin found, according to Darwin, that "when any particular variation is desired, the first step is to get the plant to vary in any manner, whatever, and to go on selecting the most variable individuals, even though they vary in the wrong direction, for the fixed character of the species being once broken, the desired variation will sooner or later appear," and Burbank has recently made the same observation.

Among lower animals variation facilitates new adaptations, but in man it has assumed an added function, that of suggesting new departures, new lines of progress, and in doing this it makes important contributions to the growth of experience. Education is always in danger of arrest from compression by immediate or "practical" aims. It should be of a sort that admits of indefinite expansion, so that in the end it may become commensurate with life; but this capacity for enlargement requires something more than knowledge. Inability to see this led to the fallacy of the educational system of the Middle Ages, and we have fallen heir to their infatuation for formal training and learning. Information did fairly well for the simple conditions of early times when the necessary adaptations of life were

neither complicated nor numerous, but if education is to be adequate to the life of to-day, it must take the whole plexus of social forces into account, and these social forces are, after all, only biological principles working in human society, to be intelligently interpreted and used for the greater life of society.

One of the elements in progress, and by no means an unimportant one, is that of which we have just been speaking, and which we may call suggestive variation. The world is moving with constantly accelerated velocity, not merely because we have more information to-day than yesterday, but because what we know means more to us, and this alchemistic power of getting out of facts something not superficially visible in them is mind's contribution to progress. Now education has never appreciated the importance of variation in human society, and for that reason has never set itself to develop it. The very capacity for variation, implying as it does a certain flexibility, facilitates ready adaptation in the individual, and its suggestive influence on society promotes adaptation in others. The means, of course, by which this influence becomes effective is speaking and writing. The function of education here is to develop a mental attitude that is friendly to variation, and to train to rightly see and interpret relations. There seems to be an impression that if we give a child or a man information enough he will at some time and in some way—though we are never told just when or how—learn to apply it to the problems of life. But the facts do not justify this view. The astonishing velocity with which science and industry are moving to-day calls for correspondingly rapid adjustment, and owing to defective principles of education we are unable

to meet the demand. This is the reason for the conflict between labor and capital. Industry has advanced so fast that society, with its instinctive method of reacting, could not keep up with it. Not educated to vary flexibly we cannot adjust ourselves in time to new conditions. We are confused and baffled by them. The intellectual element enters into human adaptations, and the more rapid the change the more conscious and purposive must adjustment become. Fitting for this adjustment belongs peculiarly to education. But here we fail. We have given too narrow an interpretation to education. Our narrow theory regards it as a preparation to adapt ourselves to a certain set of conditions, *i. e., those found existing.* The result is intellectual rigidity and obstinate resistance to evolution. The mental processes, moulded in certain mechanical forms of activity, find hardship in readjustment when conditions change, and, as we have seen, change is the rule to-day. Here, again, we are adhering too closely to the animal method, where movement is slow and rapid adaptation is not expected. Education should seek to develop a mental plasticity, a capacity for understanding and getting control of new situations, and for making them.

To-day the great changes are social. Evolutionary conditions are pressing us toward a fundamental reconstruction of society. The reconstruction is a profound *social variation.* Education—that is to say, those who have the magnificent educational equipment of the nation in charge—should have foreseen this and made the new generation of youths ready for it, should have prepared them to recognize it as another great unfoldment of man, comprehending, assisting, and developing

it. But education has been engrossed in the comparatively petty *rôle* of teaching lessons. It has fitted children for immediate, *instinctive* environment, quite omitting rational, or higher social environment. The result is present conditions—a practical dead-lock of social forces. Education cannot truly awaken the interest or command the confidence of the people until it assumes the higher function.

The present obstructors of social reconstruction or variation are the ill-educated, though perhaps very much schooled. For schooling and education, as again and again indicated, are not the same. The new social variation now beginning is an industrial readjustment which shall enable each individual, regardless of the accident of birth, to realize all of his native powers to their full value; and this will promote progress by removing artificial restrictions on individual variation. It would be very easy in this country, on the basis of accepted American principles, to effect the transition if educators, whose business is moulding minds to grasp the larger aspect of things and training them in the power to alter their views instead of reposing in fixed ones, had done their work. The current method is to impede social transitions; the intelligent course is to facilitate them. When educators rise above mere schoolmastering, social dead-locks and cataclysms will be of the past. The changes they involve will be welcomed.

While, therefore, the animal method of education is for static life—stability—with man it must be for dynamic life—change, improvement. And yet man's course in the past has not been complimentary to his intelligence, since many, if not most, of his important

alterations for the better have not been made by intelligent choice of the change itself, nor by choice of the best way, but he has resisted as long as possible, until life became so bad that nature by some kind of punishment or eruption forced improvement upon him, as she does upon animals, by her power of destruction. This is the principle of revolutions. Sometimes they succeed in raising society to the level of the few higher individuals, but often they are suppressed by the forces in resistance to variation and adaptation.

This adaptation to a large nature brings with it a complete mental reorganization. Nor, indeed, is this lacking in physical confirmation. We can already trace certain corresponding physical changes in the constitution of the brain—the increase in association-fibres in certain parts of the cortex shortly after eighteen years of age, indicated, as earlier stated, by Kaes's investigations, and the extension of Flechsig's association-centres in higher animals, and particularly in man. Some of these cerebral changes seem to occur when increasing complexities of life are making new demands on intelligence.

Recent studies,[1] suggesting that the human brain has not increased in average size for 20,000 years or more, also point to improvement in cerebral organization as the distinctive feature of the civilized brain. Further, as already observed, both Kaes and Vulpius have shown that there are additions to the association-fibres in parts of the brain long after thirty-eight years of age.

Every age brings its change of view. Acts that were once considered the most virtuous are to-day abominable. Why did not the people of past ages see at least

[1] *American Journal of Insanity*, Vol. LVIII, p. 1.

some of these things as we do and know that they were wrong? What will future generations say of us in this respect? Are we never to reach a stage of culture that will enable us to think out these questions experimentally and intellectually, so that we may jump the trying experience of intervening ages? Are we never to eliminate dark ages? The processes of human progress are extremely crude. They are simply naturalistic. Now one of the ultimate functions of education, considered in the large, is to develop a science of progress. The naturalistic way is too expensive.

We are comparing the animals, with their instinctive view of nature in its simplicity—an inherited mode of behavior developed on the basis of narrow experience —with man's mode of action. Through a more varied experience man has developed his larger view of nature as a complex, but he acts to-day preponderantly on the instinctive method of the animals. While he has acquired the use of reason, this has been only grafted upon the instinctive method of reaction. The cause of man's tardiness in abandoning the instinctive and adopting the intelligent method is that science is of modern and comparatively recent growth, and it is science that has entirely changed our conception of things, by giving us a new view of life which reveals more of the inner nature of the universe. This has made the simple animal view inadequate. Wireless telegraphy, by which England and America converse with one another through space, the X-ray with which we see through matter, and radio-activity which has established the complexity of the atom, indicate the incredible revolution that is going on in the character and scope of man's universe. But the animal takes

the simple, immediate, and direct view of the world. It assumes and accepts without question that it sees the whole thing in its simple perceptions, and man has hardly at all emancipated himself from this method of interpreting.

We have found ability to profit by experiences the test of survival among all animals. With organisms low in the scale this learning is not an individual matter, but belongs to the species and takes the form of adaptation, and the advantage is bought at an enormous cost of life. A little higher, and individuals break away somewhat from inherited modes of behavior, and action begins to be influenced by past experience. Soon this becomes common, and the animal may then properly be said to learn, though there is no evidence that at this stage utilization of experience is ever conscious. When consciousness once becomes a factor in determining action, capacity to profit by experience is a measure of intelligence, and it is just this increased sensitiveness to experience that gives the facility in adjustment of which we have been speaking. Intelligence restricts the action of natural selection by enlarging the individual's range of adaptation, and by giving insight into conditions and the power to create new ones. There is greater latitude for variation without destruction, and variation, again, may suggest other lines of progress by means of which nature's selection may be guided, so that she may find those fittest who are most appreciative of the larger, more universal, environment, which it is education's privilege to conceive and foster.

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